S

ARCHAEOLOGICAL
SURVEY
OF
ALBERTA

SIBBALD CREEK: 11,000 YEARS OF HUMAN USE OF THE ALBERTA FOOTHILLS

Occasional Paper
No. 22
1983

Eugene M. Gryba

Alberta
CULTURE

OCCASIONAL PAPERS

ARCHAEOLOGICAL SURVEY OF ALBERTA

EDITOR: David Burley

EDITORIAL ASSISTANT: Gabriella Prager

EDITORIAL BOARD:

Dr. William J. Byrne
Dr. Paul F. Donahue
Dr. Frits Pannekoek
Dr. John Lunn
Dr. David Baird
Mr. Alan Ridge

SIBBALD CREEK: A RECORD OF 11,000 YEARS OF HUMAN UTILIZATION OF THE SOUTHERN ALBERTA FOOTHILLS

by

Eugene M. Gryba

Appendix II

THE FAUNAL REMAINS FROM THE SIBBALD CREEK SITE

by

Donald A. Barnett

Prepared By:
Archaeological Survey
of Alberta

Published By:
Alberta Culture
Historical Resources Division

OCCASIONAL PAPERS

Papers for publication in this series of monographs are produced by or for the four branches of the Historical Resources Division of Alberta Culture: the Provincial Archives of Alberta, the Provincial Museum of Alberta, the Historic Sites Service and the Archaeological Survey of Alberta. Those persons or institutions interested in particular subjects may obtain publication lists from the appropriate branches. All publications produced by the Archaeological Survey of Alberta are distributed free of charge to the public. Lists of available publications and orders for specific papers should be addressed to:

Occasional Papers
Archaeological Survey of Alberta
Old St. Stephen's College
8820 - 112 Street
Edmonton, Alberta
T6G 2P8
Phone (403) 427-2355

Objectives

These Occasional Papers are designed to permit the rapid dissemination of information resulting from Historical Resources' programmes. They are intended primarily for interested specialists, rather than as popular publications for general readers. In the interests of making information available quickly to these specialists, normal publication procedures have been abbreviated.

ABSTRACT

This report presents a detailed account of the findings of the 1980 salvage excavations at site EgPr-2 which is located in the southern Alberta Foothills at Sibbald Flat some 72 kilometers due west of Calgary. The improvement of Highway 968 as part of the general Kananaskis development program necessitated the archaeological work at this site.

Sibbald Flat is a large open meadow situated along the fringe of the high forested Foothills. It had apparently attracted grazing animals and, consequently, their human predators, for thousands of years. For almost a century it has served as a grazing preserve for local ranchers.

The Sibbald Creek site is situated high above the valley floor and provided an excellent vantage of the grasslands below on Sibbald Flat. Although this site proved relatively shallow and poorly stratified the archaeological evidence revealed that it contained the refuse of successive occupation events which commenced at the time of the Fluted Point Tradition and continued without any major interruptions for an estimated 11,000 years. Artifacts were recovered that suggest this site had been utilized at least twice during the historic period.

Thousands of artifacts and other kinds of cultural information were recovered from the salvage excavations at EgPr-2 and much of this report is devoted towards their description. Apart from its wealth of information the Sibbald Creek site is significant for it is the first instance where artifacts of the Fluted Point Tradition were recovered in excavated context in western Canada.

Site EgPr-2 was originally destined for almost total destruction through back-sloping during highway construction. Fortunately, Highway 968 has since been rerouted and the remaining unexcavated part of the site has been left intact.

ACKNOWLEDGEMENTS

The successful completion of the various phases of this project was only possible through the efforts and cooperation of many individuals. To them both writers acknowledge their collective gratitude.

The senior writer supervised the field work and the data analysis and report preparation. Field assistants were drawn from the University of Calgary, Parks Canada, and other local sources. They included Donald Barnett, Gerald Burden, Wing Chin, Jonathan Driver, Archie Herbert, Tom Hoffert, Adrienne Jex, Richard Lalonde, Helen Lemon, Gregory Lutick, Siu Ma, Margaret Newman, Maureen Newman, Ian Robertson, Merlin Rosser, Gideon Smith, Allan Stevenson, and Jerry Svencicki. Members of the Calgary Chapter of the Archaeological Society of Alberta who participated on a few occasions included Dr. and Mrs. Jean Cody, Jim Humphreys, Allison Humphreys Mahaffey, Brian Mahaffey, and Mr. and Mrs. Bud Vine.

Members of the highway construction project must be commended for their tolerance with the archaeological team and their general interest in this province's human history. The project coordinator, Mr. Vince Mulloy of Torchinsky Consulting (1976) Ltd., deserves a special vote of thanks for revising construction plans so that the archaeological work could continue.

Mrs. May Chin helped in cleaning the mass of artifacts. The material was catalogued by Eugene M. Gryba and Donald Barnett. Donald Barnett carried out the analysis of the faunal remains and prepared the section of this monograph which covers the faunal material. Eugene M. Gryba handled the rest of the artifacts and composed the other sections of the report. He also took all the photos included in the report, with the exception of Figure 6 which was supplied by the Government of Alberta Resource Evaluation and Planning Department. The two authors produced the illustrations which are found in their respective sections of the report.

Equipment and facilities were made available at the University of Calgary through the cooperation of the Head of the Department of Archaeology, Dr. S. Raymond. Brian Kooyman, a graduate student at the Department, assisted Donald Barnett with the identification of some of the more difficult faunal specimens. Valuable suggestions on the faunal material also came from Dr. Michael Wilson of the Department of Geology. Dr. Margaret Hanna, a former doctoral candidate at the

Department of Archaeology, analyzed the native ceramics recovered from site EgPr-2.

Dr. Lionel E. Jackson, an environmental geologist with the Geological Survey of Canada at Calgary, provided the senior writer with an on-site interpretation of the geological history of the Sibbald Creek site and gave valuable insights into the Pleistocene events of the Foothills area, in general. Particle size analyses of the soils samples collected from EgPr-2 were carried out by Doug Schnurrenberger, a graduate student at the University of Alberta, Edmonton, through the arrangement of Professor Alan Bryan. Gregory Lutick and Adrienne Jex compiled the inventory of plant species current in the vicinity of Sibbald Flat. They also assisted in identifying the historic period artifacts recovered from EgPr-2.

Many days and nights, weekdays and weekends, were spent in processing the data and compiling and revising this final report. The senior writer would like to express his gratitude especially to his landlord, Mr. Wing Chin, for tolerating the conversion of the apartment suite into a seemingly disorganized lab and office complex, and for enduring the many postponed fishing trips as the report was pushed to completion. The use of the Barnett residence as a faunal laboratory is also greatly appreciated.

Linda Barnett provided constructive criticism on the chapter pertaining to the faunal remains. Both authors exchanged ideas about the report, and the archaeological information, in general, over vicious contests at the chess board. The revisions to the original 1981 draft made by Dr. Ray LeBlanc of the Archaeological Survey of Alberta were well received by both writers. The senior writer typed the initial and final drafts of the report while Donald Barnett checked them for errors.

TABLE OF CONTENTS

ABSTRACT ii

ACKNOWLEDGEMENTS iii

TABLE OF CONTENTS v

LIST OF FIGURES viii

LIST OF TABLES FOUND IN TEXT xiii

LIST OF TABLES FOUND IN APPENDIX I xv

PART I: GENERAL OVERVIEW 1
- INTRODUCTION 1
- THE SCOPE OF THE REPORT 2

PART II: NATURAL ENVIRONMENT OF SIBBALD FLAT 5
- INTRODUCTION 5
- GENERAL SETTING 5
- BEDROCK GEOLOGY 10
- PLEISTOCENE GEOLOGY 11
- MODERN DRAINAGE 14
- PRESENT DAY CLIMATE 17
- VEGETATION 18
- FAUNA 20
- PALEOENVIRONMENTAL SITUATION 21
- THE ETHNOHISTORIC DATA 22

PART III: SITE EgPr-2 24
- INTRODUCTION 24
- LOCATION OF SITE EgPr-2 24
- SITE SETTING 25
- DISCOVERY AND EARLY ASSESSMENT OF SITE EgPr-2 28
- OBJECTIVES OF THE 1980 FIELD SEASON AT SITE EgPr-2 31
- EXCAVATION STRATEGIES AND PROCEDURES 31
- SITE STRATIGRAPHY 36
- NATURE AND SOURCE OF THE CULTURE-BEARING MATRIX 40

PART IV: THE CULTURAL MATERIAL FROM EgPr-2 43
- INTRODUCTION 43
- THE PREHISTORIC CULTURAL MATERIAL 43
- DEBITAGE 44

PROJECTILE POINTS 51
Plains Side-Notched 52
Plains Triangular 52
Prairie Side-Notched. 54
Besant 54
Pelican Lake. 56
Hanna 57
Duncan 57
Oxbow 58
Mount Albion 62
Scottsbluff 63
Agate Basin 65
Midland 66
Fluted Point Tradition 66
Unidentifiable Point Fragments 69
BIFACE KNIVES 70
DRILLS AND PERFORATORS 76
GRAVERS 78
NOTCHED FLAKE 82
NOTCHED RETOUCHED FLAKE 82
RETOUCHED FLAKES 83
END SCRAPERS 96
SIDE SCRAPERS 104
SCRAPER PLANES 109
WEDGE 110
CHOPPERS. 110
ANVIL STONES 115
ABRADERS 116
HAMMERSTONES 116
CORES 116
NATIVE CERAMICS. 120

PART V: THE TEMPORAL AND HORIZONTAL ASPECTS OF PREHISTORIC OCCUPATION AT EgPr-2 122
INTRODUCTION 122
THE TEMPORAL ASPECT 122
THE HORIZONTAL ASPECT 129
Introduction 129
0-5 cm and 5-10 cm layers 132
10-15 cm and 15-20 cm layers 135
20-25 cm and 25-30 cm layers 139
30-35 cm and 35-40 cm layers 142
40-45 cm layer 145

PART VI: THE HISTORIC CULTURAL MATERIAL 148
INTRODUCTION 148
NINETEENTH CENTURY HISTORIC MATERIAL.............. 148
Bottles 148
Metal Container Covers 150
Pipes 150
Teaspoon 152
Awl 152
Tack 152
Lead Blob 152
Beads 152
TWENTIETH CENTURY MATERIAL 154

PART VII: SUMMARY AND CONCLUSIONS 155

APPENDIX I 160

APPENDIX II 182

BIBLIOGRAPHY 212

LIST OF FIGURES

Figure Page

1. Map of central Canada showing location of Sibbald Flat . . . 6

2. Location map for sites EgPr-2, EgPr-5 and EgPr-6 7

3. Photo showing EgPr-2 in Foothills setting 8

4. Photo showing landscape to east of Sibbald Flat 9

5. Surficial geology of Sibbald Flat vicinity 15

6. Air photo of Sibbald Flat and vicinity 16

7. General view showing setting of EgPr-2 26

8. Setting of EgPr-2 viewed from floor of Sibbald Flat 26

9. Contour map of site EgPr-2 27

10. Location of excavation units at EgPr-2 33

11. Excavations in progress at EgPr-2 35

12. General view of excavations at EgPr-2 35

13. View of the compressed stratigraphy at EgPr-2 38

14. View of shallow deposits at EgPr-2 38

15. View of shallow deposits at EgPr-2 39

16. View of shallow deposits at EgPr-2 39

17. Graphic depiction of the results of the analyses of soil samples from EgPr-2 41

18. Graphic representation of lithic debitage recovered from the Block Excavation at EgPr-2 45

19. Percentage distribution of the debitage recovered from the Block Excavation at EgPr-2 47

20. Vertical distribution of different lithic types from the Block Excavation shown graphically 48

21. Projectile points from the upper levels of the Block Excavation 53

22. Projectile points from the upper levels of the Block Excavation 53

23. Late and Middle Prehistoric points from outside the Block Excavation at EgPr-2 55

Figure

Page

24. Late and Middle Prehistoric Period points from the upper layers of the Block Excavation 55

25. Points from the middle and lower layers of the Block Excavation at EgPr-2 60

26. Pelican Lake and Oxbow points from outside the Block Excavation at EgPr-2 60

27. Oxbow points from the Block Excavation at EgPr-2 61

28. Paleo-Indian points from the Block Excavation 64

29. Reverse aspect of points shown in Figure 28 64

30. Paleo-Indian points and tools from the Block Excavation . . . 68

31. Bifaces from the 5-15 cm zone of the Block Excavation. . . . 72

32. Bifaces from the 10-20 cm zone of the Block Excavation . . . 72

33. Bifaces from the 15-20 cm layer of the Block Excavation . . 73

34. Bifaces from the 20-30 cm zone of the Block Excavation . . . 73

35. Hafted biface and another biface from the 20-25 cm layer of the Block Excavation 74

36. Oval bifaces from the lower layers of the Block Excavation 74

37. Quartzite biface from the 40-45 cm layer of the Block Excavation 75

38. Bifaces from outside the Block Excavation. 75

39. Retouched flake and bifaces from outside the Block Excavation 77

40. Stone tools found outside the Block Excavation. 77

41. Possible Paleo-Indian tools from EgPr-2 80

42. Gravers from EgPr-2. 81

43. Classification of retouched flakes from EgPr-2 84

44. Retouched flakes from the 5-10 cm layer of the Block Excavation 85

45. Retouched flakes from the 10-15 cm layer of the Block Excavation 85

Figure Page

46. Retouched flakes from the 15-20 cm layer of the Block Excavation 86

47. Retouched flakes from the 15-20 cm layer of the Block Excavation 86

48. Retouched flakes from the 20-25 cm layer of the Block Excavation 87

49. Retouched flakes from the 25-30 cm layer of the Block Excavation 87

50. Two large retouched pieces from the 25-30 cm layer of the Block Excavation 88

51. Retouched flakes from the 30-35 cm layer of the Block Excavation 88

52. Retouched flakes from the 35-40 cm layer of the Block Excavation 89

53. Retouched flakes from the 40-45 cm layer of the Block Excavation 89

54. Retouched flakes from the 40-45 cm layer of the Block Excavation 90

55. Retouched flakes from the 45-50 cm layer of the Block Excavation 90

56. Retouched flakes from outside the Block Excavation 95

57. Classification of end scrapers from the Block Excavation . . 97

58. End scrapers from the 0-10 cm zone of the Block Excavation 98

59. End scrapers from the 10-15 cm layer of the Block Excavation 98

60. Three large end scrapers from the 10-20 cm zone of the Block Excavation 99

61. End scrapers from the 20-35 cm zone of the Block Excavation 99

62. End scrapers from the 35-40 cm layer of the Block Excavation 100

63. End scrapers from the 40-50 cm zone of the Block Excavation 100

64. Massive retouched flakes from outside the Block Excavation 105

Figure Page

65. Two side scrapers from the lower levels of the Block Excavation 105

66. Massive retouched flakes (side scrapers) from the 40-45 cm layer of the Block Excavation 106

67. Side scrapers from the 40-45 cm layer of the Block Excavation 106

68. Heavy stone tools from the Block Excavation 107

69. Cobble choppers from the 20 cm level of the Block Excavation 107

70. Two cobble choppers from the Block Excavation 112

71. Two cobble choppers from the Block Excavation 112

72. Massive cobble chopper from the Block Excavation. 113

73. Two core choppers from the lower levels of the Block Excavation 113

74. Massive core chopper from the 35-40 cm layer of the Block Excavation 114

75. Siltstone abrader from the 40-45 cm layer of the Block Excavation 114

76. Sample of cores from the Block Excavation 118

77. Bipolar cores and pièces esquillées from the Block Excavation 118

78. Bipolar cores from outside the Block Excavation 119

79. Vertical distribution of points from the Block Excavation and cultural chronology for the Northwestern Plains 124

80. Artifact and feature distribution map for the 0-5 cm layer of the Block Excavation 133

81. Artifact and feature distribution map for the 5-10 cm layer of the Block Excavation 134

82. Artifact and feature distribution map for the 10-15 cm layer of the Block Excavation 137

83. Artifact and feature distribution map for the 15-20 cm layer of the Block Excavation 138

84. Artifact and feature distribution map for the 20-25 cm layer of the Block excavation. 140

Figure Page

85. Artifact and feature distribution map for the 25-30 cm layer of the Block Excavation 141

86. Artifact and feature distribution map for the 30-35 cm layer of the Block Excavation 143

87. Artifact and feature distribution map for the 35-40 cm layer of the Block Excavation 144

88. Artifact and feature distribution map for the 40-45 cm layer of the Block Excavation 147

89. Painkiller bottles recovered from EgPr-2 149

90. Metal covers recovered from EgPr-2 151

91. Historic period artifacts from EgPr-2 151

92. Historic period artifacts from EgPr-2 153

93. Historic period artifacts from EgPr-2 153

94a Axial skeletal remains from the 0-5 cm layer of the Block Excavation 185

94b Axial skeletal remains from the 5-10 cm layer of the Block Excavation 186

95a Appendicular skeletal remains from the 0-5 cm layer of the Block Excavation 187

95b Appendicular skeletal remains from the 5-10 cm layer of the Block Excavation 188

95c Appendicular skeletal remains from the 10-15 cm layer of the Block Excavation 189

96. Faunal remains other the bison from EgPr-2 190

97. Bison bones from EgPr-2 bearing butchering marks 198

98. Bison leg elements from EgPr-2 showing butchering marks . 201

99. Bones from EgPr-2 showing steel tool marks 204

100. Close-up views of two bones from EgPr-2 showing steel tool butchering marks 205

101. Close-up view of possible awl from EgPr-2 206

102. Probable bone tools from EgPr-2 207

LIST OF TABLES FOUND IN TEXT

Table Page

1. Inventory of plants identified at Sibbald Flat 19
2. Summary of hydrometer and sieve analyses on the soil samples collected from EgPr-2 41
3. Plains Side-Notched points from EgPr-2 52
4. Plains Triangular points from EgPr-2 54
5. Prairie Side-Notched points from EgPr-2 54
6. Besant points from site EgPr-2 56
7. Pelican Lake points from site EgPr-2 57
8. Duncan points from site EgPr-2 58
9. Oxbow points from site EgPr-2 59
10. Mount Albion points from site EgPr-2 63
11. Agate Basin points from site EgPr-2 65
12. Distribution of bifaces from the Block Excavation 70
13. Drills and perforators from site EgPr-2 76
14. Gravers from site EgPr-2 79
15. Distribution of retouched flakes from the Block Excavation 91
16. Statistical comparison of two samples of retouched flakes recovered from site EgPr-2 94
17. Distribution of end scrapers in the Block Excavation . . . 101
18. Spurred end scrapers from the Block Excavation 102
19. Side scrapers recovered from site EgPr-2 108
20. Distribution of choppers in the Block Excavation 110
21. Distribution of anvil stones in the Block Excavation . . . 115
22. Distribution of cores in the Block Excavation 117

Table Page

23. Articulating faunal elements from site EgPr-2 192

24. Minimum number of individuals identified at EgPr-2 . . . 195

25. Metaconid and entoconid heights of bison molars from EgPr-2 and estimated age of the animals 196

26. Skeletal remains at EgPr-2 showing steel tool marks . . . 209

LIST OF TABLES FOUND IN APPENDIX I

Table		Page
Ap-1	Detailed results of the hydrometer and sieve analyses of soil samples from EgPr-2	161
Ap-2	Quantitative and qualitative attributes of projectile points from the Block Excavation.	163
Ap-3	Quantitative and qualitative attributes of projectile points from outside the Block Excavation	166
Ap-4	Quantitative and qualitative attributes of bifaces from the Block Excavation at EgPr-2	168
Ap-5	Quantitative and qualitative attributes of gravers recovered from site EgPr-2	170
Ap-6	Quantitative and qualitative attributes of retouched flakes from the Block Excavation at EgPr-2	171
Ap-7	Quantitative and qualitative attributes of end scrapers recovered from the Block Excavation	179

PART I: GENERAL OVERVIEW

INTRODUCTION

This report presents the results of archaeological investigations which were conducted under Archaeological Agreement 80-114C. The work entailed salvage excavations at the Sibbald Creek site (EgPr-2) and evaluative testing of two nearby sites (EgPr-5 and EgPr-6). All three sites are situated in the southern Alberta Foothills 72 kilometers due west of Calgary. This archaeological work was necessitated as a result of the upgrading of Highway 968 as part of the general Kananaskis development program. All three sites were to be directly impacted by highway construction.

Field work was carried out between the first week of August, 1980, and the second week of November. The senior writer supervised the field party. Throughout the season it ranged in number from a few individuals to as many as ten and consisted of people drawn from the University of Calgary, Parks Canada, and other local sources.

The primary focus of the archaeological project was the salvage excavation of site EgPr-2. The productive core area of this site was slated to be almost totally destroyed by back-sloping which was required as a result of the widening of the highway in the immediate vicinity. The site was relatively shallow and displayed no visible evidence of natural stratification. However, the discovery of artifacts of the Fluted Point Tradition here, plus the general wealth of artifacts and information the site contained that related to later prehistoric and historic occupations, was reason enough to rank the Sibbald Creek site as one of major importance. When Paleo-Indian material was encountered, the archaeological agreement was amended and additional funds for salvage excavations were provided. The general assumption at this time was that changes to the highway design to lessen or eliminate its impact to EgPr-2 would be very costly, hence the need for larger scale salvage efforts.

By the end of the 1980 field season a total of 234 man-days was expended on the excavations at the Sibbald Creek site and a further 20 were spent in the testing of sites EgPr-5 and EgPr-6. A total of 198 square meters, or roughly a third of the endangered core area of the Sibbald Creek site, was salvaged. By the end of the 1980 field season highway construction had advanced to within two kilometers of EgPr-2.

In the spring of 1981 the feasibility of altering the highway design and saving the remaining portion of the Sibbald Creek site was examined. A lower route was eventually selected for Highway 968 in order to completely avoid the site. This represents one of the few instances in this province where major modifications were undertaken in the midstream of the construction program so that an important archaeological site could be saved. This precedent aptly reflects the changing attitude within the public and government sectors regarding the management and preservation of this country's prehistoric archaeological resources.

THE SCOPE OF THE REPORT

This study must first of all be considered to be a site report in which is presented a descriptive account of the cultural material and information recovered from the archaeological investigations at the Sibbald Creek site, EgPr-2. Because EgPr-5 and EgPr-6, by comparison, yielded very little in the way of archaeological information, no further mention will be made here of the work at these two sites.

PART II covers the past and present natural environments of the general vicinity of Sibbald Flat. Unlike the contemporary situation where the greater proportion of the human population lives in a man-made urban setting, the prehistoric hunters and their families ranged within an environment which they themselves probably had less drastic impact on for thousands of years. A familiarity of the environments they occupied is therefore requisite if we are to meaningfully interpret their settlement and subsistence patterns.

In PART III some of the more significant aspects of the Sibbald Creek site are dealt with in detail. These include the local setting, the history of its discovery and early assessment, the requirements and objectives of the 1980 archaeological project relating specifically to EgPr-2, the strategies and procedures relied upon during the excavation program, and an examination of the stratigraphy of the site.

PART IV deals with the lithic artifacts and debitage recovered from the excavations at the Sibbald Creek site. Photos and pen drawings are used to illustrate the more diagnostic artifacts. Tables are included wherever possible here and in APPENDIX I in order to reduce the volume of the report and still make specific data easily available to other researchers. Many of the tables serve to visually depict the contextual or proportional distributions of various tool types or lithic material varieties recovered from the excavations at EgPr-2.

In PART V the temporal and spatial aspects of the prehistoric cultural material recovered from the Sibbald Creek site are examined. The site was first occupied by people of the Fluted Point Tradition, perhaps between 11,200 to 10,200 years ago and continued almost without any major interruptions throughout the rest of the prehistoric period. The latest prehistoric occupation of the Sibbald Creek site was by the makers of the Plains Side-Notched projectile points. Many of the prehistoric culture complexes which appear in the archaeological record of southern Alberta are represented at EgPr-2.

In terms of the spatial aspect, the data gleaned from the Block Excavation are used to reconstruct the horizontal distributions of different tools and campsite features recorded for EgPr-2. Even with the apparent problems relating to compressed stratigraphy, when the data for each level are plotted it is possible to identify various activity areas on the resulting diagrams for the different levels of the Block Excavation. In the concluding chapter it is tentatively suggested that the average sized group that camped at the Sibbald Creek site may have comprised four to six families.

The historic period cultural material discovered at the Sibbald Creek site is described in PART VI. The artifacts reflect at least two periods of historic use of EgPr-2; one possibly by Assiniboine hunters during the latter half of the last century and another by hunters, tourists, or other people, around the middle of this century.

The final section of the main text, PART VII, sums up a few of the more significant results of the archaeological investigations at Sibbald Flat. It is suggested that within the regional context, the Sibbald Creek site served principally as a winter campsite for hunters drawn from the Plains, Foothills and Rocky Mountain environments. It is also proposed that patterns of prehistoric adaptive strategies could be best demonstrated if other sites in the area were excavated and reported.

APPENDIX II deals with the faunal remains which were retrieved from the Sibbald Creek site. In this major supplement, the horizontal and vertical distributions and cultural associations of the faunal remains, the minimum number of individual animals of various species represented, the age and sex of the bison and possible season at which they were killed as revealed by the teeth, and the modification of the bones of various species through butchering, processing or tool manufacture, are examined.

Because of the generally poor preservation at EgPr-2, the faunal remains were restricted to the upper 20 cm level of the deposits. Only burnt bone scraps were found below this. The faunal remains reflect two periods of site use. The earlier period is identified by the stone and bone tool marked bison remains. On the basis of the associated artifacts it is tentatively attributed to the occupation of EgPr-2 by the makers of Plains Side-Notched points during the Late Prehistoric Period. The more recent period of site use is recognized by the presence of steel tool marked bones of animals other than bison. The butchering marks observed on these bones and the presence of historic period artifacts at the site, provisionally suggest an occupational event dating to the last half of the nineteenth century.

PART II: NATURAL ENVIRONMENT OF THE SIBBALD FLAT AREA

INTRODUCTION

A general familiarity with the present and past environmental conditions is requisite if one is to reasonably interpret the record of human occupation of any area or region. This knowledge is basic to understanding patterns of settlement and resource utilization and their variations through time and space. The information of past environments is critical in reconstructing the history of human settlement of any area and in explaining gaps that might exist in the chronological sequence.

GENERAL SETTING

Sibbald Flat (also locally referred to as "Sibbald Flats") is situated in the southern Alberta Foothills at 51° 2' 30" north latitude and 114° 52' west longitude. The general area lies 72 kilometers due west of Calgary and is situated within the forested foothills which occur between the Northern Plains and the Rocky Mountains (Figure 1).

Sibbald Flat is the name given to a local channel which has been carved out of an outwash plain by glacial meltwaters near the confluence of Sibbald and Jumpingpound Creeks (Figure 2). It is roughly 2.4 kilometers long and almost one kilometer wide. The valley floor is fairly even and is strewn with numerous boulders. Frank Sibbald, the son of Andrew Sibbald who was the first teacher on the Morley Reserve, pastured cattle here during the 1890's and the first few decades of this century. About 1910 the general area was incorporated into the Bow-Crow Forest Reserve, but even to this day it continues to serve as a summer grazing reserve for the local ranching community.

The terrain in the vicinity is quite rugged. High hills surround Sibbald Flat on the north, west and south (Figure 3). The elevation at Sibbald Flat is 1450 meters above sea level while at Ole Buck Mountain, located several kilometers to the northeast, it reaches well over 1700 meters. Peaks of comparable height are present just west of Sibbald Flat (Figure 3). Eight kilometers to the southwest Moose Mountain rises well above the tree line to an elevation of 2430 meters. The Front Range of the Rocky Mountains, with peaks rising to over 2700 meters above sea level, lies 10 kilometers west of Sibbald Flat and is only visible from the top of the higher hills. To the east the terrain becomes progressively less rugged for a distance of around 11 kilometers at which point the Foothills merge with the Plains (Figure 4).

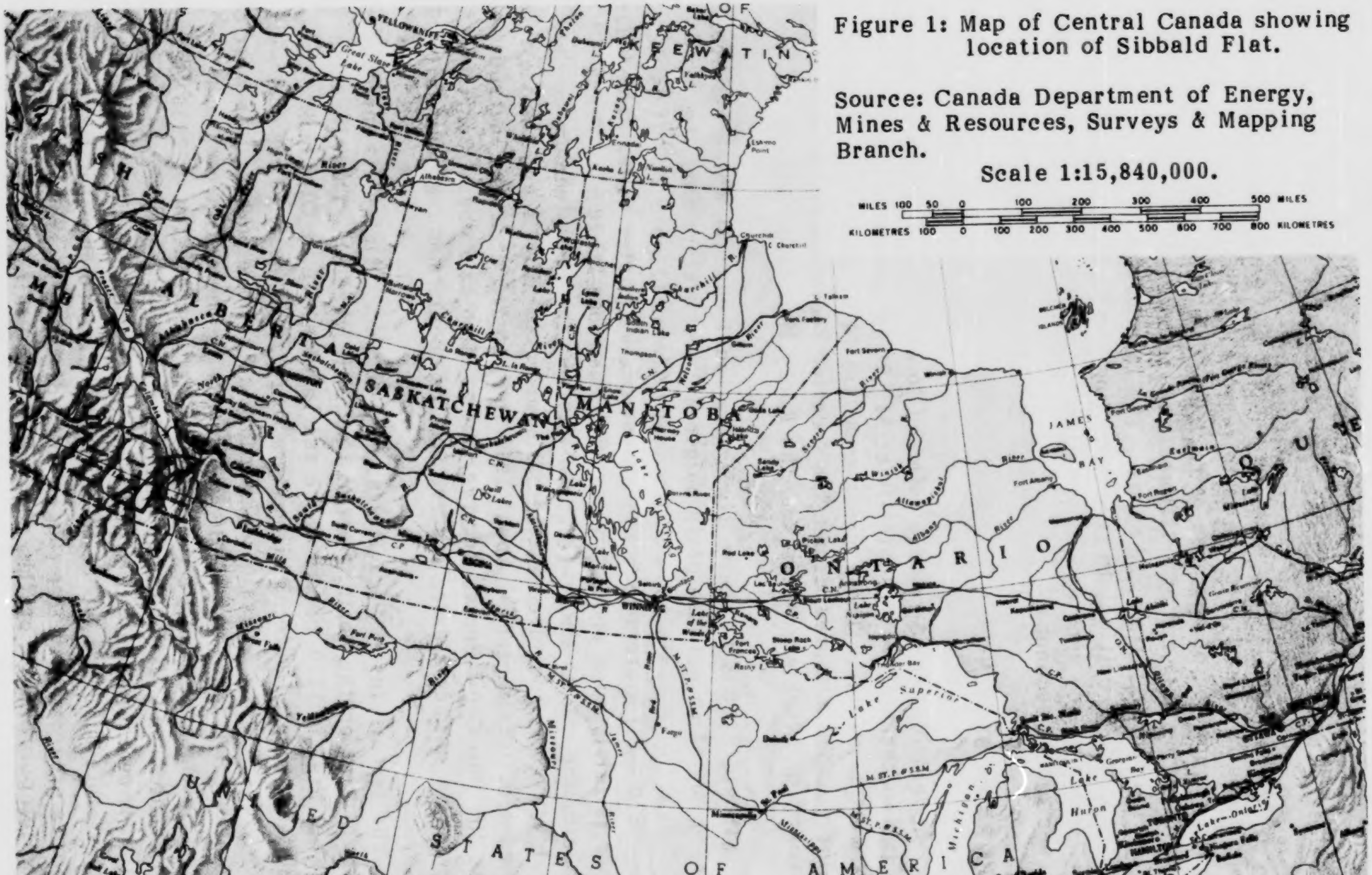

MILES 100 50 0 100 200 300 400 500 MILES
KILOMETRES 100 0 100 200 300 400 500 600 700 800 KILOMETRES
KEEWATIN
ALBERTA
SASKATCHEWAN
MANITOBA
ONTARIO
QUEBEC
JAMES BAY
Lake Winnipeg
Lake Superior
Lake Michigan
Lake Huron
Lake Ontario
Lake Erie
UNITED STATES OF AMERICA
Great Slave Lake
Churchill
Missouri
WINNIPEG

Figure 1: Map of Central Canada showing location of Sibbald Flat.

Source: Canada Department of Energy, Mines & Resources, Surveys & Mapping Branch.

Scale 1:15,840,000.

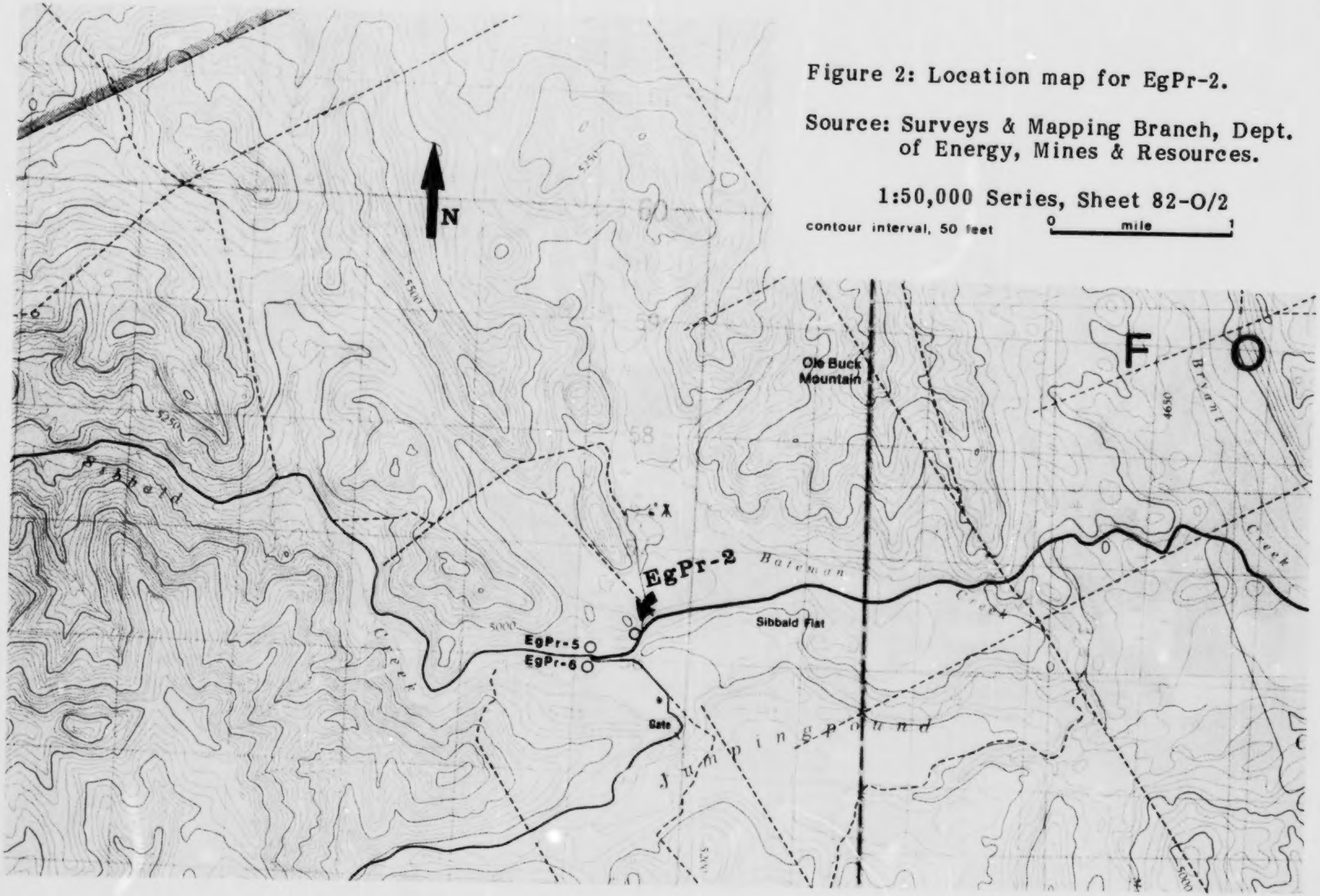

N
Ole Buck Mountain
F
O
Bryant Creek
4650
60
59
58
5500
5250
5000
EgPr-2
Bateman Creek
Sibbald Flat
Sibbald Creek
EgPr-5
EgPr-6
Gate
Jumpingpound

Figure 2: Location map for EgPr-2.

Source: Surveys & Mapping Branch, Dept. of Energy, Mines & Resources.

1:50,000 Series, Sheet 82-O/2

contour interval, 50 feet

0 mile 1

Figure 3: A view west from the east end of Sibbald Flat showing the general environmental setting. The arrow points to EgPr-2. Also identified on the photo are Highway 968 (1), Sibbald Creek (2), Jumpingpound Creek (3), and the spot from which Figure 4 was taken (4). The Front Range of the Rocky Mountains are faintly visible beyond the valley of Jumpingpound Creek on the left.

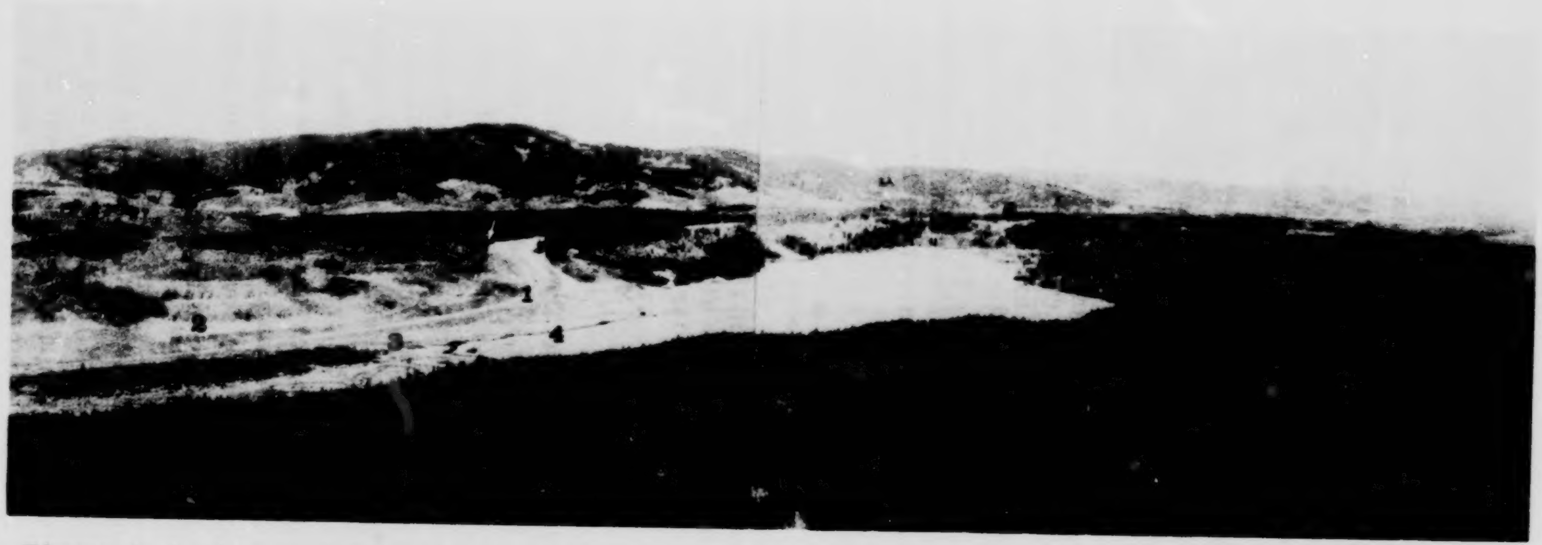


Figure 4: A view east from the slope of the high hill immediately west of Sibbald Flat showing the locations of EgPr-2 (arrow), Highway 968 (1), EgPr-5 (2), EgPr-6 (3), Sibbald Creek (4), Jumpingpound Creek (5), the spot from which Figure 3 was take (6), and Ole Buck Mountain (7). The terrain beyond the distant ridge at the right becomes less rugged and merges with the open Plains.

BEDROCK GEOLOGY

The band of foothills that flank the eastern side of the Rocky Mountains in the vicinity of Sibbald Flat comprise contorted rocks of predominantly Mesozoic age. Writing of the bedrock geology of the Moose Mountain and Morley Map area Beach (1943:5) remarks that:

> all the rocks exposed within the region are of sedimentary origin. Not less than 14,000 feet [4267 meters] of muds, marls, silts, sands, and gravels were deposited over the region from Cambrian to Cretaceous times. But sedimentation was not continuous, as there were evidently long periods of nondeposition and widespread erosion. No strata of Ordovician, Silurian, or Permian age or beds definitely assignable to the Triassic have been found. The Paleozoic rocks are, so far as known, all of marine origin. The Mesozoic formations include both marine and non-marine deposits. The strata have been folded extensively and faulted. They dip at various angles and not uncommonly are vertical or overturned.
>
> Exposures of the Paleozoic rocks are confined to the Rocky Mountains and to the cores of the two large anticline structures, Moose Mountain dome and forgetmenot anticline. Mesozoic strata form the uppermost bedrock in the remainder of the foothills parts, . . .

Exposures of rocks of the Mesozoic Upper Alberta (Wapiabi) formation are indicated to be present at Sibbald Flat (Beach ibid:Map 777A). Rocks of this formation consist principally of dark marine shales and sandy shales. Excellent exposures of shales could be seen at the eastern end of Sibbald Flat and at the spot where Jumpingpound Creek enters the valley of Sibbald Creek. The Lower Alberta (Blackstone) formation is shown to be present along the western part of Sibbald Flat. It also consists of black marine shales and sandy shales, but it also contains some minor thin sandstone beds. The highly weathered sandstones that are exposed several hundred meters west of EgPr-2 may belong to the Lower Alberta formation.

Rocks of the Blairmore group cover the landscape from just beyond the western end of Sibbald Flat west to Lusk Creek and the Kananaskis River. Rocks of this group are the major constituent of the bedrock geology of the Morley and Moose Mountain region. The Lower Blairmore

The Alberta Historical Resources Act states that it is illegal to excavate an archaeological site (Section 26), or to alter, mark or damage an archaeological or paleontological resource (Section 30), without a valid research permit or the written permission of the Minister. Under Section 48, any person who contravenes this Act is liable to a fine of not more than $50,000 or to imprisonment for a term of not more than one year or to both fine and imprisonment.

contains a massive pebble conglomerate with an estimated thickness of around 76 meters. Beach (ibid.:39), in describing the Lower Blairmore conglomerates in the Canyon Creek-Elbow River area, notes that they:

> exhibit considerable uniformity, . . . , in the size and lithology of the component pebbles. The pebbles are well rounded and average 1.5 to 2.5 inches [3.8 to 6.3 cm] in diameter. Locally, cobbles up to 5 inches (12.7 cm) have been noted. Angular or subangular fragments are of rare occurrence. The pebbles are mostly chert or quartzite. The chert ranges in colour from black to greyish white and the quartzite from milky white to light yellow.

Beach suggests that this chert may have originally been derived from the Selkirk Mountains to the west. The chert from the conglomerate at Canyon Creek was examined by the senior writer and was found to be quite similar to some of the debitage recovered at the Sibbald Creek site.

The upper part of the Blairmore consists of massive beds of coarse-grained sandstones and pebble conglomerate. The Upper Blairmore conglomerate contains well rounded pebbles of igneous rocks (porphyry) and green cherts, in addition to black cherts and white quartz. In the Lusk Creek area Beach (ibid.:40) encountered a pebble conglomerate that had an assemblage quite similar to that of the Upper Blairmore conglomerate but differed in the respect that the individual pebbles were considerably larger, some of them exceeding five inches (12.7 cm) in length.

The general area has been extensively explored for oil and gas and the countryside is scarred by numerous survey cut lines. Producing wells are found in the vicinity of Moose Mountain and the Elbow River as well as on the north side of Little Jumpingpound Creek. Coal is shown to outcrop along Jumpingpound Creek some five kilometers downstream from Sibbald Flat (Beach ibid.:Map 777A).

PLEISTOCENE GEOLOGY

The events of the Pleistocene Epoch had a direct effect on the human occupation of the southern Alberta Foothills. Climatic conditions played a major role in the initial and subsequent settlements of the area. The Laurentide and Cordilleran ice sheets and the melt waters from them, aside from burying or destroying possible traces of earlier human occupation, reshaped the landscape, changed established drainage systems, redistributed soils and rocks, and, in general, directly or indirectly affected the past and present biotic communities, including human populations.

The glacial history of southwestern Alberta has intrigued researchers for decades, first, because of the complexity of the deposits and surficial geomorphology of this zone of overlap between the glaciers of Rocky Mountain and Laurentide provenance, and, lately, because of the interest that the concept of an ice free corridor, or corridors, and their implications for the initial peopling of the new world has generated among many archaeologists. Reeves (1973:10) points out that the geological interest in the relationship between the Cordilleran and Laurentide ice sheets in southwestern Alberta dates back to the published reports of Dawson in 1881 and Tyrrell in 1890.

The most comprehensive recent study of the local geological history is that undertaken by Jackson of the Kananaskis Map Sheet (1977), the northern border of which lies only several kilometers south of Sibbald Flat (Jackson 1979:9 and 10; 1980:459-477). On the basis of till units he recognized four major glacial episodes. According to him (1980:469) "the three oldest glaciations included both alpine and Laurentide advances which coalesced or, if they were nonsynchronous, overlapped in extent." The latest, or most recent, episode included a Laurentide advance which terminated just east of Calgary and two alpine advances which did not reach east of the mountain front.

In terms of dating, the first two episodes have been tentatively assigned an Illinoian age on the basis of fossil evidence recovered by Stalker and Harrison (1977) from stratigraphic units that may correlate with those identified by Jackson. Jackson's two most recent episodes, Glacial Episode Three and Glacial Episode Four, are regarded by him to date to the Early and Late Wisconsin, respectively (Jackson 1980:473).

According to Jackson (ibid.:471), Glacial Episode Three marks the last coalescence of glacial ice originating in the Rocky Mountains with the Laurentide ice sheet, at least in the Kananaskis area. He remarks that:

> glaciers flowed out of the Bow, Elbow, Sheep, and Highwood valleys into the easternmost Foothills and parts of the Prairies and presumably formed piedmont lobes. At some point the piedmont ice impinged upon the southward moving Laurentide ice sheet. The Laurentide ice sheet was flanked along its leading edge by glacial ice diverted southward from the Athabasca valley and

> perhaps intervening valleys. This "bumper" of Rocky Mountain and Cordilleran ice bore the Foothills Erratics Train upon its surface. The progressive coalescence of the piedmont ice occupying the Foothills with the Laurentide ice sheet caused the flow direction of the Bow valley glacier to be dictated by the regional slope of the Laurentide ice sheet. A generally southeasterly flow from the Bow valley between Moose Mountain and Calgary area created a drumlinized terrain. The consequence of this flow was to create a nearly continuous ice sheet over the easternmost Foothills and Prairies of the study area (i.e., Kananaskis Map Sheet) from glaciers originating from the Bow, Elbow, Sheep, and Highwood basin and the Athabasca drainage. Today, the southward margin of this ice mass is marked by an end moraine which runs along the northern end of the Porcupine Hills at 1370 m elevation.

As the Alpine and Laurentide glaciers wasted away, the terrain in the Foothills became exposed. Proglacial lakes formed in many of the valleys and as the ice sheets retreated they were lowered and eventually drained. Jackson (ibid.:472) notes that the ice free conditions that were established in the Foothills following the retreat of the ice of Glacial Episode Three have persisted to the present.

The time when Glacial Episode Three took place has not been fixed. The only available date relating to this episode is one of 49,400 ± 400 years B. P. (GSC-2409) which was obtained on a spruce log that was recovered from the Erratics Train Till in the southeastern part of Calgary (ibid.:473). Jackson feels that since the date falls at the end of the maximum limits of radiocarbon dating, the date quoted above should be regarded as being actually greater than this figure. Dates of 18,400 ± 380 (GSC-2668) and 18,500 ± 1090 (GSC-2670) years B. P. were obtained from peat deposits that were recovered from nine and ten meters below the surface at the Chalmer's bog southwest of Turner Valley. They indicate the minimum date when the Foothills were ice free. How long before this had they been exposed is not known; the bottom of the post-glacial deposits at the Chalmer's bog had not been reached by coring. Jackson feels that because of the highly eroded character of the glacial deposits in the Foothills, as compared to those which were deposited by the more recent advances in the Front Range, the terrain on the eastern slopes had been exposed for some time prior to 18,500 years ago. In personal communications he expressed the belief that the land at Sibbald Flat had remained ice free since Early Wisconsin times, or before 18,500 years ago.

The last major glacial event to influence the area was Glacial Episode Four. A major Laurentide ice sheet advanced to a point just east of Calgary. One of the proglacial lakes that formed before it occupied the Bow Valley and deposited sediments, the Midnapore silts, on what is today the southern part of Calgary. In the mountains there were two advances. The earliest of the two was the Canmore Advance. In the Bow Valley it reached as far east as the confluence of the Kananaskis and Bow Rivers near the town of Seebe, just east of the Front Range. Glaciers also developed in the extreme upper reaches of Canyon Creek, Elbow River, Sheep River, and other streams which flowed east across the Foothills (Jackson 1980: Figure 11). Jackson (ibid.:472) notes that the overall intensity of the Canmore Advance decreased from the northern part of his study area to the south. Citing radiocarbon dates, he concludes (ibid.:474) that the Canmore Advance had reached its maximum extent immediately prior to 12,000 years ago.

The last significant Alpine advance in the region was the Eisenhower Junction Advance. It is thought to have occurred several millennia after the Canmore Advance but was restricted to the area mainly north of Elk Pass.

The surficial geology of the Sibbald Flat area is shown in Figure 5. The young till which mantles much of the landscape may have been deposited by a glacier which flowed down the Bow valley and was deflected southward during Glacial Episode Three. Sibbald Flat may have been last flushed out by melt waters which resulted from this advance. Jackson (personal communication 1981) expressed the opinion that, because of the significant height of land present between Sibbald Creek and the Kananaskis River, any water which may have been trapped in the Kananaskis Valley during the Canmore Advance would have escaped into the Bow River by way of Chiniki Lake. On this reasoning he felt that Sibbald Flat was last overrun by glacial ice during the Early Wisconsin, or perhaps, even earlier. Noticable aggradation of Sibbald Flat with sediments derived from the valley of Jumpingpound Creek has occurred since the last major glacial event in the area (Figure 6).

MODERN DRAINAGE

Sibbald Creek and Jumpingpound Creek both originate in the Foothills east of the Front Range, merge at the east end of Sibbald Flat (Figure 6), and then flow east and north to enter the Bow River just above the town of Cochrane about 25 kilometers upstream from Calgary. The valley of the Bow River lies 12 kilometers north of Sibbald Flat.

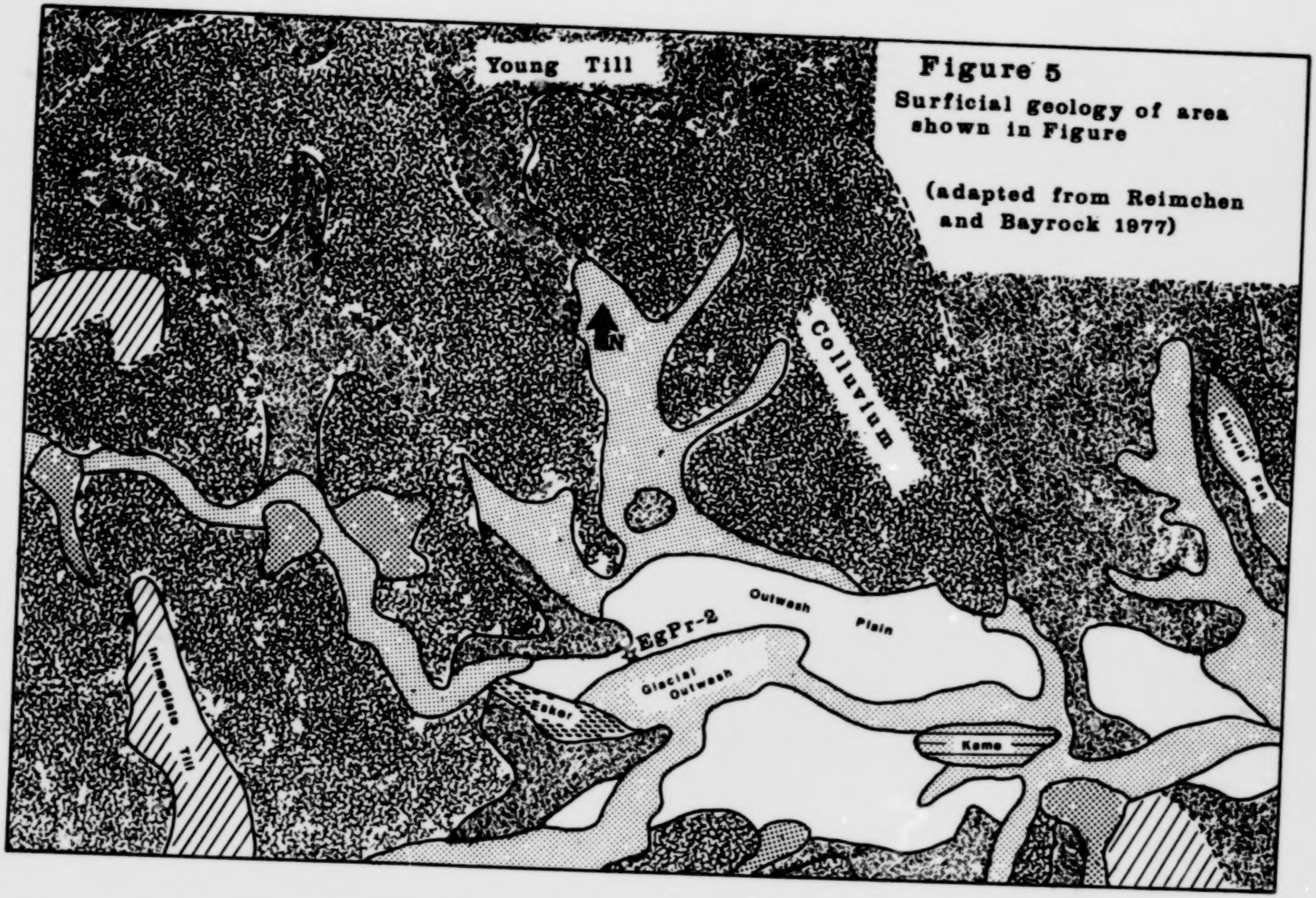

Young Till
Colluvium
Alluvial Fan
Outwash Plain
EgPr-2
Glacial Outwash
Esker
Kame
Intmediate Till
N

Figure 5
Surficial geology of area shown in Figure

(adapted from Reimchen and Bayrock 1977)

Figure 6: Air photo coverage of Sibbald flat and vicinity. White arrow points to EgPr-2.

Both Sibbald and Jumpingpound Creeks contain flowing water during the summer months and even during mild winters such as that witnessed in 1980-1981. The other significant stream in the region is the Elbow River. It flows 20 kilometers south of Sibbald Flat and enters the Bow River at Calgary.

PRESENT DAY CLIMATE

Trewartha has placed the southern Alberta Foothills area within the BSk region in the Koppen classification scheme of world climates (Espenshade 1970:14-15). This is a mid-latitude dry or semi-arid climate with short cool summers and long cold winters. However, because of their proximity to the mountains and greater elevation, the Foothills show considerable climatic difference from that seen on the Plains to the east. Westerly winds frequently flow over the mountains and are warmed and dried in the process. These Chinook winds have been recorded to raise the surface temperature by as much as 40 Fahrenheit degrees in a matter of minutes (Longley 1967:55). These warm winds are quite common in the southern Foothills, particularly during the fall and spring seasons, and often affect the weather far out on the Plains. Their impending arrival is usually marked by a pronounced arch of clouds which develops east of the mountain front.

Poliquin (1968), using readings gathered at various stations throughout the southern Foothills, compiled the mean annual temperatures and precipitation for four regions located between Nordegg and the International Boundary. The region, which includes Sibbald Flat, has a mean annual temperature of 1.6 degrees Celsius. The highest and lowest temperatures recorded are 32.2 degrees and -41.1 degrees Celsius, respectively. The average annual precipitation for the area is 62.4 centimeters; 54 percent of this falls during the summer season between May and October, while the remaining preciptiation occurs between October and May. The data compiled by Poliquin reveals that, in the Highwood River area to the south, there is an increase in precipitation in the order of around 38 centimeters per 304 meters rise in elevation. A similar general pattern should exist elsewhere in the Foothills except in areas of rainshadow.

Although Moose Mountain, which is located around eight kilometers southwest of Sibbald Flat, extends well above the treeline, it is clear of snow by early summer. Similarly, the peaks along the Front Range lose their snow cover during the summer months.

VEGETATION

The suppression of forest fires since the creation of the Bow-Crow Forest Reserve around 1910, and the use of the area by ranchers as summer pasture has, undoubtedly, resulted in the development of plant communities that differ markedly from those which dominated the vicinity around Sibbald Flat throughout the last century and before that. Today Sibbald Flat lies within a forested area that is dominated by lodgepole pine (*Pinus contorta*), aspen (*Populus tremuloides*), and white spruce (*Picea glauca*). In Alberta this area extends from the International Boundary north to the Grande Prairie district (Webb, Johnston and Soper 1967:102).

The general area around Sibbald Flat encompasses a variety of microenvironments. Six different ones were recognized within close proximity to the archaeological sites. A partial inventory of the various plant species for each microenvironment was compiled by field assistants Gregory Lutick and Adrienne Jex (Table 1, Columns 1 to 6). The microenvironments include the high knolls located immediately north of sites EgPr-2 and EgPr-5 (Column 1); the dry, steep, south-facing slope which forms the north boundary of Sibbald Flat (Column 2); the wetter, north-facing slope of Sibbald Flat (Column 3); the valley floor away from the stream banks (Column 4); the terrain adjacent to Jumpingpound and Sibbald Creeks (Column 5); and, the marshy areas such are those present a kilometer northwest of EgPr-2 and in the uplands south of Jumpingpound Creek (Column 6).

This field inventory was undertaken in early spring when summer foliage had not yet developed, and it is acknowledged that some plant species that may have figured important in Indian subsistence could easily have been overlooked. The potential aboriginal use, or uses of the various plant species identified are listed in column 7 of Table 1. A very detailed account of the various plants utilized by the Blackfoot and other indigenous groups in southern Alberta is presented by Johnston (1969:109-177). According to him (ibid.:109), the Blackfoot may have utilized 171 species belonging to 134 genera of plants distributed among 55 families. In addition to their uses as food, the different parts of certain plants, that is, leaves, bark, berries, seeds, roots, stalks and branches, were used for medicine, dyes, perfumes, beads and other decorative paraphernalia, dwelling frames and drying racks, tool handles, weapons, and fuel.

Table 1: Inventory of plants identified at Sibbald Flat

PLANTS	MICROENVIRONMENTS 1	2	3	4	5	6	USES 7
lodgepole pine (*Pinus contorta*)	D	D	D		x		c
alpine fir (*Abies lasiocaipa*)		x					c
white spruce (*Picea glauca*)	x		x	x	x	x	c
trembling aspen (*Populus tremuloides*)	x	x	x	x	x	x	cv
balsam poplar (*P. balsamiferous*)					x		c
willow (*Salix discolor*)				D	x	x	cm
rose (*Rosa woodsii*)		x			x	x	bf
low juniper (*Juniperus communis*)	x	x	x		x		m
kinnikinnick (*Arctostaphylos uva ursi*)	x	x	x		x		sm
buffalo berry (*Shepherdia canadensis*)	x						f
scrub birch (*Betula glandulosa*)		x		x	x		
Labrador tea (*Ledum groenlandicum*)			x				b
low bush cranberry (*Viburnum edule*)	x	x	x				
gooseberry (*Ribes oxyacanthoides*)	x				x		f
snowberry (*Symphoricarpos albus*)					x		mc
alder (*Alnus crispus*)	x						
shrubby cinquefoil (*Potentilla fruticosa*)				x	x	x	
onion (*Allium textile*)		x					v
fireweed (*Epilobium angustifolium*)	x	x			x		
yarrow (*Achillea millefolium*)				x			m
wintergreen (*Pyrola spp.*)	x	x	x		x		
strawberry (*Fragaria virginiana*)		x					fbm
bunchberry (*Cornus canadensis*)			x				
creeping snowberry (*Gaultheria hispidula*)					x		
anemone (*Anemone canadensis*)		x				x	m
cow parsnip (*Heracleum lanatum*)		x					m
dock (*Rumex spp.*)				x			m
sedges (*Carex spp.*)				x		x	
grasses (various species)	x	x		D		x	
club moss (*Selaginella densa*)	x	x					

Symbols: D = dominant; x = present; c = construction, tools and weapons; v = vegetable food; b = beverage; f = fruit; m = medicine; and, s = smoked. See also Johnston (1969:109-177).

FAUNA

The Foothills west of Calgary were the home of many of the large mammals which were indigenous to southern Alberta. To many it served as a wintering ground and later, during the intense European encroachment, as a refugium. Today, the ranges of many animals, as well as their actual numbers, have been seriously reduced as a consequence of European settlement.

Sibbald Flat was within the range of bison (*Bison bison*) probably until the last half of the nineteenth century, as attested by the faunal remains recovered from EgPr-2. The general area continues to be inhabited by elk (*Cervus elaphus*), moose (*Alces alces*), white-tail and mule deer (*Odocoileus virginianus* and *O. hemionus*), lynx (*Lynx canadensis*), black bear (*Ursus americanus*), coyote (*Canis latrans*), badger (*Taxidea taxus*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), porcupine (*Erethizon dorsatum*), red squirrel (*Tamiasciurus hudsonicus*), rarely by cougar (*Felis concolor*), grizzly bear (*Ursus arctos*) and wolf (*Canis lupus*), plus a host of smaller mammals (Soper 1964).

Both mountain sheep (*Ovis canadensis*) and mountain goat (*Oreamnos americanus*) occur within the Front Range west of Sibbald Flat. According to Soper (ibid:363-364) caribou (*Rangifer tarandus fortidens*) once occupied Banff National Park and were fairly common in Jasper National Park. However, by 1964 the caribou population had been severely reduced and the major concentrations by then were located north of the Yellowhead Pass.

The Foothills, in general, are marginal to the major waterfowl flyways. In the vicinity of EgPr-2, the significant water bodies are the beaver ponds present along Sibbald and Bateman Creeks and the small sloughs by the Sibbald Flat Recreation Area. During the fall of 1980 only a few ducks were noticed on these ponds, and this may well reflect the situation which prevailed here in the past.

Upland game birds and birds of prey sighted near Sibbald Flat include ruffed grouse (*Bonasa umbellus*), raven (*Corvus corax*), common crow (*Corvus brachyhynchos*), and bald eagle (*Haliaeetus leucocphalus*). Canada jays (*Perisoreus canadensis*) were frequent visitors during the archaeological excavations. For a more complete listing of the various avifauna common to the Foothills the reader is directed to the comprehensive work of Salt and Wilk (1958).

Jumpingpound Creek and its tributary streams, Sibbald and Bateman Creeks, are currently protected trout spawning territories. Because of their relative proximity to the Bow River it is likely that these streams contained fish, even if on a seasonal basis, throughout much of the past.

PALEOENVIRONMENTAL SITUATION

The possibility of obtaining palynological data from a nearby source to extend the interdisciplinary coverage of the archaeological investigations at the Sibbald Creek site was considered to be beyond the scope of the study. However, the studies carried out by MacDonald (1980) on core samples obtained from the Yamnuska bog and at Wedge Lake in the Kananaskis Valley and Morley Flats area northwest of Sibbald Flat (MacDonald 1981:Figure 1), provide a general impression of the reconstructed paleoenvironment for the southwestern part of Alberta. The earliest part of the sequence, in particular, is the poorest known.

According to MacDonald (1980:60), "cold, dry, tundra-like conditions" prevailed for the period following the retreat of the glaciers to around 11,500 years ago. While the presence of arctic tundra conditions for the Foothills has been suggested by the data recovered from the Chalmer's bog (Jackson 1979:108) for the period shortly after 18,400 years ago, the time of 10,500 B. P. set by MacDonald for an end to this environment may be far too recent even for the Front Range area. Ritchie (1976:1813), referring to other sources, notes that the pollen evidence from the late Wisconsin (14,000 to 11,000 B. P.) reveals that the entire central part of the continent was occupied by a spruce forest which extended from the ice margin in Manitoba, Saskatchewan and Alberta down to northeastern Kansas, central Illinois and the Great Lakes area. In southwestern Saskatchewan the buried organic sediments at the Hafichuk, Herbert, and Scrimbit sites reflect that an abrupt change from a *Picea*-*Artemisia* assemblage type to one dominated by non-arboreal elements occurred around 10,500 to 10,000 years ago (Ritchie 1976:1798).

For the Calgary area, the occurrence of remains of the extinct camelid *Camelops cf. hesternus* in association with *Bison bison antiquus* and *Equus conversidens*, and dated to 11,300 ± 290 B.P. (RL-757) (Wilson and Churcher 1978:729), is interpreted by the two authors (ibid.:738) as being indicative of a somewhat open habitat with a vegetative cover that included broad-leafed trees and grasses. The presence of projectile points of the Fluted Point Tradition at Lake Minniwanka in

Banff National Park (McIntyre and Reeves 1975) is an indication that the environment within the Rocky Mountain Front Range was already suitable for human habitation perhaps as early as 11,000 to 10,500 years ago. Indubitably, the primary factor which brought hunters to EgPr-2 throughout much of prehistory was the megafauna which grazed on and in the vicinity of Sibbaid Flat. If this assumption holds true then it is reasonable to assume that at least the valley floor and other bottomlands in the area were dominated by grasses and that this type of vegetation had already become established by the time that the makers of the fluted points arrived in the region, perhaps sometime between 11,200 and 10,300 years ago.

The climatic amelioration reflected by the early Holocene vegetation changes continued, according to MacDonald (ibid.:64) referring to various sources, until shortly after the deposition of the Mazama ash. He notes that several researchers, Alley (1972), Fergusen (1978) and Reeves and Dormaar (1972), detected a period of climatic deterioration roughly between 9,000 and 8,000 years ago for the mountain and Foothills region.

In the last 6,000 years two significant episodes of deteriorating climate have been discerned by a number of researchers (MacDonald ibid.:66-70): one shortly following the Mazama ash deposition and the other perhaps between 3,000 and 1,100 years ago. MacDonald notes that the data indicate that there were significant regional differences in the extent of the changes. The evidence from the Sibbald Creek site suggests that this was a period of rather intensive use of EgPr-2 and offers some evidence to suggest that local conditions may have been quite favorable. Hopefully, when pollen studies are carried out for the Sibbald Flat area we will have a better understanding of the types of impact that past climatic changes brought about upon local vegetation patterns.

THE ETHNOHISTORIC DATA

Skeels reconstructed the locations of Indian "tribes" in Alberta at the time of first European contact. She shows that the Rocky Mountain and Foothills areas from the Athabasca River to the south were occupied by the Kootenay, Saleesh and Snake, respectively (Skeels 1967:Figure 3). The Plains to the east were inhabited by the Blackfoot, Blood and Piegan.

Christensen (1971:2), with reference to Simpson (1847:114 and 116), mentions that the Assiniboine (Stoneys) had been observed in the vicinity of Lake Minnewanka in 1841, and the Cree even before this date. The Cree, no doubt, had taken over territories that had been abandoned by the Kootenay. The mission at Morley was set up in 1873. Four years later the Sarcee, Blackfoot and Assiniboine signed Treaty No. 7, surrendering much of the lands they had occupied in southern Alberta (Atlas of Alberta 1969:46).

Frank Sibbald, the son of Andrew Sibbald who was the first teacher at Morley, started to herd cattle at Sibbald Flat during the 1880s. In 1910 the Bow-Crow Forest Reserve was created. It includes the mountain and Foothills areas from the Red Deer River south to the International Boundary. The practice of running cattle in the Foothills at Sibbald Flat during the summer season continues even today.

PART III: SITE EgPr-2

INTRODUCTION

EgPr-2 is the most important of the three sites tested under Archaeological Agreement 80-114-C. Its primary significance, aside from the overwhelming wealth of information it holds concerning past human occupation of the Sibbald Flat area, lies in the fact that it represents the first discovery of artifacts of the Fluted Point Tradition in excavated context in western Canada.

In the following pages various aspects of the site such as its setting, a brief history of the archaeological work carried out, the general nature of the cultural deposits, results of the excavations, interpretation of the results, and conclusions and recommendations, will be covered. The most lengthy section, of course, will be the one concerned with the excavation results.

The thousands of artifacts recovered from EgPr-2 indicate that this site was a popular habitation spot and was frequented by people of most of the well known cultural traditions that once flourished in southern Alberta. Although stratification was poorly developed, and while none of the components have been radiocarbon dated, the evidence provided by the cultural material, nevertheless, suggests that the site had been first occupied by hunters of the Fluted Point Tradition, perhaps 10,000 to 11,000 years ago. Three radiocarbon dates obtained on organic particles removed from arbitrary layers in the lower half of the deposits (5,850 ± 190 B. P. (GX-8809), 7,645 ± 260 B. P. (GX-8810), and 9,570 ± 320 B. P. (GX-8808) (Ball 1983; Gryba n. d.)) support the conclusion of a lengthy record of occupation which was initially indicated by typologic identifications and stratigraphic evidence. Two historic period components uncovered at the Sibbald Creek site reflect the popularity of the location even to people during the recent past.

LOCATION OF SITE EgPr-2

The Sibbald Creek site is located in the southern Alberta Foothills in the Jumpingpound Creek drainage area 73 kilometers due west of Calgary. The site lies in LSD 1 and 2 of Section 14, Township 24, Range 7, west of the Fifth Meridian. Its military grid number is 11UPG 495563. The general area is part of the Bow-Crow Forest Reserve. The site is located along the north side of Highway 968 about 100 meters west of the entrance to the Sibbald Flat Recreation Area.

SITE SETTING

Some mention of the general setting of EgPr-2 has been made earlier, particularly in Part II. It is located in the Foothills amidst terrain that within a kilometer of the site becomes moderately rugged (Figures 2 and 3). The local peaks, created by the extensive folding of the sedimentary strata, are somewhat eroded and support a forest cover dominated by lodgepole pine. Aspen and mixed forest stands prevail on the southern aspect of the smaller knolls while patches of grasslands are restricted mainly to the valley floors and outwash plains. Sibbald Flat, a broad melt water carved channel at the confluence of Sibbald and Jumpingpound Creeks (measuring roughly 300 hectares), is the largest of the open plains in the area (Figure 6).

The site is situated on a narrow remnant of an outwash plain nestled against the south side of a small hill. The outwash plain once covered a rather extensive area of around six square kilometers (Figure 5) which included an area stretching east to Bateman Creek and both sides of Sibbald Flat. It is easily identified in the field by its horizontal aspect and by the gravel matrix exposed in road side cuts and along the banks of Sibbald Flat.

The western section of the "terrace" on which the site is located, and the valley side in the vicinity, are covered by a light growth of aspen while pine dominates the sandier eastern part of EgPr-2 (Figures 7 and 8). Aspen and spruce are found on the summit of the knoll behind the site. The presence of burnt tree stumps on the knoll and the fact that one of the larger aspen trees removed from EgPr-2 had over 80 growth rings, suggest that the general area had already been forested even prior to the establishment of the Bow-Crow Forest Reserve around 1910.

The Sibbald Creek site is most intriguing for it reflects a very deliberate selection of a habitation spot on the part of the former occupants. It is a location that offers a combination of basic requisites for human survival such as shelter and warmth, vantage over a large animal grazing range, and a general proximity to a diversity of natural resources. The core area of the site is located in the lee of a high hill in a spot well protected from the cold north winds (Figure 9). Because of its south-southeasterly exposure and its position high above the adjacent open terrain to the south, it can receive the sun's rays from early morning until evening. From its setting 50 meters above the valley floor, EgPr-2 offers a commanding view of all but the extreme northeast corner of an 800 hectare grazing reserve. It also lies around

Figure 7: View of EgPr-2 looking west from just south of Highway 968. The Block Excavation is located on the terrace roughly in the middle of the photo. The core area extends to the right into the pine, and to the left to the end of the photo. The knoll behind the site is visible through the trees.

Figure 8: The setting of the Sibbald Creek site as seen from the valley floor. The right-of-way for Highway 968 has been cleared. The arrow points to the core area of the site.

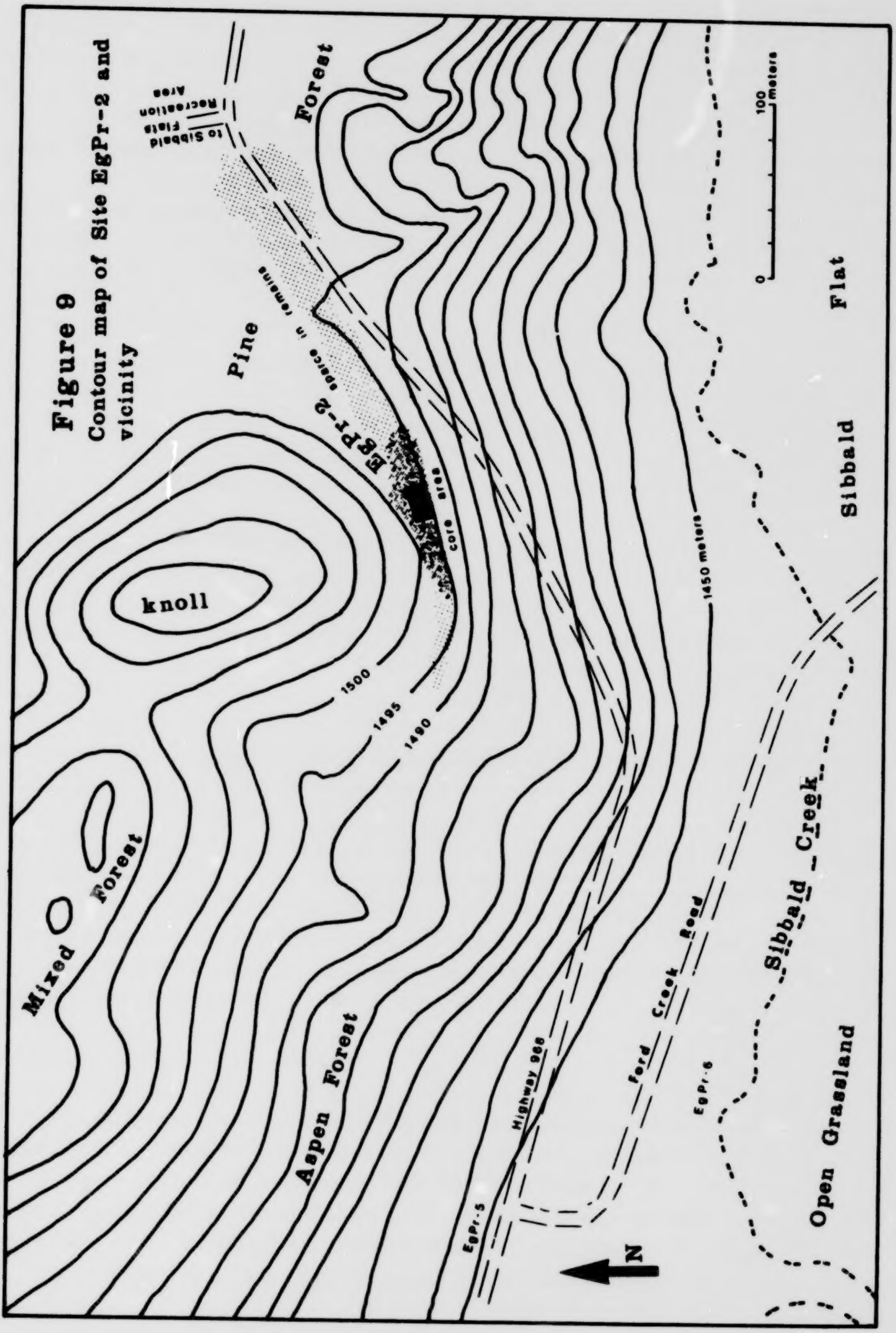


Figure 9
Contour map of Site EgPr-2 and vicinity

to Sibbald
Flats
Recreation
Area
Pine
Forest
EgPr-2
sparce lithic remains
core area
knoll
1500
1495
1490
1450 meters
0
100
meters
Mixed
Forest
Aspen Forest
Highway 968
Ford Creek Road
Sibbald Creek
EgPr-5
EgPr-6
N
Open Grassland
Sibbald
Flat

a kilometer or two away from smaller meadows and marshes which are located to the north of the high hill behind EgPr-2 and along the upper reaches of Bateman Creek. Today Sibbald Creek flows uninterrupted along the north side of the valley within 200 meters of the site, and this may have been the situation in the past. The many abandoned channels seen on the air photo (Figure 6) indicate that there were times when Jumpingpound Creek flowed much closer to the north side of the valley than it does today. The tremendous quantity of gravel and cobbles exposed along the north slope of Sibbald Flat is an immediate and inexhaustible stock of raw lithic material relatively suitable for the manufacture of tools and weapon tips.

From a somewhat broader perspective, Sibbald Flat represents, locally, one of the last large open meadows. To the west rise the steep forested peaks. Here, along the narrow V-shaped valleys of Jumpingpound and Sibbald Creeks, only small scattered meadows occur. Today these valleys serve as transportation corridors and, undoubtedly, in the past they channeled pedestrian traffic to and from the mountain interior. People from the mountain interior coming out on the Plains to hunt bison by way of one of these valleys need not have traveled further than Sibbald Flat (that is, if the pasture conditions were favourable) and, conversely, hunters from the Plains following the herds into the shelter of the Foothills would have been discouraged from going beyond Sibbald Flat.

DISCOVERY AND EARLY ASSESSMENT OF SITE EgPr-2

The initial discovery of EgPr-2 was made by J. Brink of the Archaeological Survey of Alberta during a shovel test examination of the southern part of a planned expansion to the existing Sibbald Flat Recreation Area (Brink 1979:79-80). On the basis of limited productivity following extensive shovel testing, Brink suggested that the eastern portion of EgPr-2 probably represented a small transitory campsite and recommended that this area was not worthy of further investigations.

In August, 1979 the senior writer, assisted by R. Hall, surveyed the proposed alignment for Highway 968 under Archaeological Agreement 79-68 from the eastern boundary of the Forest Reserve west to the Ford Creek Road junction (Gryba 1980c:46-65). During this time, prospective site locations beyond both sides of the highway right-of-way were shovel tested. This included the area situated along the terrace to the west of that tested by Brink. This resulted in the discovery of the main part, or core area, of EgPr-2.

With the realization that considerable back-sloping would be required during the widening of Highway 968 at this point, and an awareness that clearing of the right-of-way was scheduled for the winter of 1979-1980, the senior writer submitted a proposal to carry out evaluative test excavations at this and three other sites discovered along Highway 968. The proposal was approved and excavations were conducted at the four sites under Archaeological Agreement 79-148 during the first three weeks of November, 1979 (Gryba 1980b). In spite of the lateness of the season and the presence of ground frost, a total of 17 square meters of EgPr-2 was sampled.

The results of the November test excavations were fairly encouraging. One historic and five prehistoric components were identified, the earliest being Oxbow. In the final report on this field work it was argued that one should expect to find even earlier components represented at EgPr-2, perhaps those of the later Paleo-Indian complexes such as Plainview, Scottsbluff and Eden (Gryba 1980b:37). But, be that as it may, the results of these evaluative excavations were alone sufficient to indicate the archaeological importance of EgPr-2.

During the 1979 field season survey stakes were already in place to mark out the 40 meter wide highway right-of-way. The northern boundary of the alignment ran roughly parallel with the terrace rim just a few meters south from the edge of the site. At the time of the November testing an elevation transect was taken extending from the valley floor up to the side of the hill north of the site (Gryba 1980b:Figure 45). Even to the casual observer it was apparent that any widening of Highway 968 within the proposed alignment at this point would entail considerable downcutting and some back-sloping. At this time no plans were yet available which showed the location or extent of potential back-slope areas and, hence, the degree to which the Sibbald Creek site might be impacted. This, then, was the context in which the recommendations presented in the End-of-Season Report (Gryba 1980b:166) and Final Report (Gryba 1980c:38) for Archaeological Agreement 79-148 were made.

Salvage excavations were recommended for the Sibbald Creek site, the amount being conditional upon the extent of possible site impact. It was also stated (Gryba 1980b:66) that the alternatives to excavating included keeping the area that would be impacted to a minimum or else relocating the alignment to a lower level.

The Sibbald Creek site was flagged off in January, 1980. The highway design was approved by Alberta Transportation the following month. The design showed that at the point where Highway 968 descended into Sibbald Flat a considerable amount of down cutting and back-sloping would, indeed, be required and could not easily be avoided. As a consequence of this the central and most productive portion of EgPr-2 was to be destroyed.

The contract for the road clearing and construction was awarded during the early part of summer, 1980. At the end of July, 1980 the senior writer was approached by the Archaeological Survey of Alberta to undertake the task of salvaging between 80 and 100 square meters, or about 10 percent of the endangered portion of EgPr-2. Eighty man-days of field time was budgeted to meet this objective. When the excavations commenced on August 2 clearing of the right-of-way was already underway at the eastern end of the highway project. Six days later the bulldozers reached Sibbald Flat.

The actual road construction was to start at the western end of the highway project at the Ford Creek Road junction, a kilometer west of EgPr-2, and then proceed eastward. The highway project coordinator, Mr. V. Mulloy of Torchinsky Consulting (1976) Ltd., and members of the Archaeological Survey of Alberta were kept up-to-date on the progress of the salvage excavations and the nature of the discoveries. The possibility of early components occurring below the Oxbow zone at EgPr-2 had been suggested after the November, 1979 evaluative test excavations (Gryba 1980c:37). On August 1, five days into the 1980 salvage program, the senior writer informed the people at the Archaeological Survey of Alberta in Edmonton in a telephone conversation and by letter that cultural material, indeed, occurred below the Oxbow level. Although no diagnostic Paleo-Indian artifacts had yet been recovered at this time, the senior writer mentioned that a Folsom component was probable. As it turned out, four components were eventually identified below the Oxbow zone at EgPr-2, including Mount Albion, Agate Basin, Scottsbluff, and a Fluted Point Tradition component.

When the presence of Paleo-Indian material was confirmed and the importance of the site realized, the highway construction schedule was altered. The schedule and plans were revised so that construction would commence at the eastern end of the highway project near the Jumpingpound Creek Ranger Station 10 kilometers east of EgPr-2, thus ensuring additional time for the archaeological work. Funds were, therefore, made available for an additional 100 man-days of salvage excavations.

OBJECTIVES OF THE 1980 FIELD SEASON AT SITE EgPr-2

The primary objective of the 1980 field season at the Sibbald Creek site was to salvage, through controlled excavations, a portion of the endangered area of the site. The units were to be located in a way that would maximize the return of artifacts and information about the site.

Initially, it was decided to sample approximately 10 percent of the site area and in order to accomplish this task, funds for 80 man-days of field time were made available. This number was increased by a further 86 when it became obvious that EgPr-2 contained a Fluted Point Tradition component. Because of the importance of EgPr-2, and the belief at the time that destruction of the site by highway construction was unavoidable, funds which had been destined originally for other aspects of the archaeological project were channelled into man-days. Altogether, 234 man-days were expended at EgPr-2 during the 1980 field season and 198 square meters, or roughly one third of the endangered portion of EgPr-2, was salvaged.

EXCAVATION STRATEGIES AND PROCEDURES

It was determined very early in the project that the core area of the site, that is, that part of EgPr-2 which was profuse with campsite and workshop debris, was centered within a small open enclave along the terrace. Very conspicuous natural features restricted human settlement here to a limited area (Figures 7, 8, and 9). The high knoll and the valley rim bound the site on the northwest and southeast, respectively. To the southwest, the bench narrowed considerably and at the western limit of the potential impact zone it was only several meters wide (Figure 10). Here the soil overlying the outwash gravels was around a decimeter deep. Shovel tests yielded either negative results, or else disclosed a thin scattering of cultural material. Still further west along the bench the shovel tests proved unproductive, although a small side-notched point was discovered on the surface of a cattle path in the vicinity of 86W. This location is some 90 meters southwest of the center of the large Block Excavation.

The eastern boundary of the site was less well-defined. In the vicinity of 24W there was still a fair representation of cultural refuse. However, the deposits here were less than 20 centimeters deep and displayed signs of considerable mixing. Back-sloping was to affect the site for another 20 meters northeast of this locality, but from this point east to the entrance to the Sibbald Flat Recreation Area (Figure 9), an area that lies close to 200 meters northeast of the Block Excavation, extensive and intensive shovel testing by Gryba and Hall, and earlier by Brink, yielded a very dismal return of cultural material. A thorough search of this area even after the right-of-way had been cleared of trees by a bulldozer and the ground visibility greatly enhanced, failed to turn up more than an occasional flake. Understandably, this area was avoided for camping since this part of the outwash plain was not only removed some distance from the valley edge but would also have been, in the absence of a protective tree cover, exposed to the north and northeast winds that likely swept along the east side of the high hill.

After considering the constraints that the local environment imposed upon the distribution of prehistoric settlement, the results of the previous shovel tests and evaluative excavations, and the proposed extent of back-sloping, the initial test units of the 1980 season were placed along the length of the terrace midway between the escarpment rim and the base of the hill. The basic assumption was that the zone of maximum human traffic and activity, and consequently campsite debris, should be situated along the central part of the bench. Furthermore, the earlier excavations suggested that the vertical separation of components might be best developed in this area of the site. Consideration was also given to testing the peripheries of the site, particularly near the base of the hill, in order to determine the nature and the up-slope extent of the cultural material.

The windfalls which littered the central part of the site, and the young aspen and shrubs, were removed. During the November, 1979 excavations, an east-west baseline had been established roughly parallel with the rim of the escarpment. In actual fact the line ran more in a southwesterly-northeasterly direction, but for recording purposes the long axis of the terrace was regarded as being oriented in an east-west direction. South was referred to as the direction towards Sibbald Flat and north as extending up-slope.

The two by two meter grid system that had been set up during the November excavations was extended to cover much of the core area of the site. The east-west and north-south baselines were intentionally assigned relatively high numbers so that all units would have a north and west reference (Figure 10). Each two by two meter excavation unit was identified by its southwest corner stake. Since the horizontal provenience was to be recorded to a square meter, the two by two meter excavation units were subdivided into southeast, southwest, northeast and northwest quadrants.

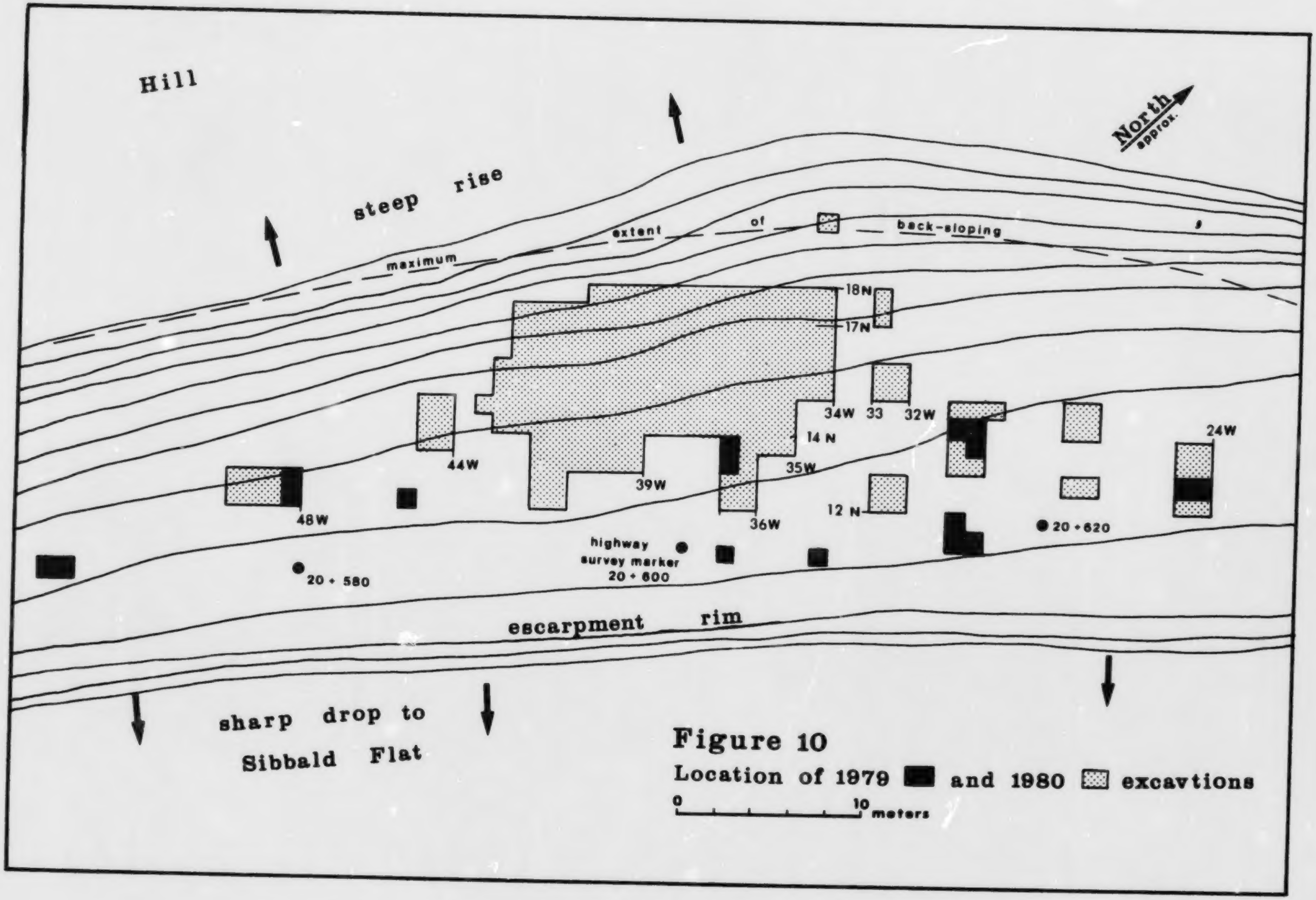


Figure 10

Location of 1979 ■ and 1980 ▨ excavtions

Hill
North
approx.
steep rise
maximum extent of back-sloping
18N
17N
34W
33
32W
14 N
35W
24W
44W
39W
48W
12 N
36W
20 + 620
highway
survey marker
20 + 600
20 + 580
escarpment rim
sharp drop to
Sibbald Flat
0
10
meters

The 1979 preliminary test excavations revealed a general lack of visible natural stratification in the cultural deposits. Because of this and the time factor involved, the excavation technique used entailed the removal of the culture-bearing matrix from each meter quadrant in arbitrarily defined five centimeter layers. The layers were measured parallel with present ground surface. The vertical profiles suggested that in the vicinity of the Block Excavation there had been a fairly uniform accumulation of sediments over the surface of the outwash gravels. The culture-bearing deposits did thin out up-slope, as well as towards the escarpment rim, but the change was not regarded to be very significant within the length of a meter.

The salvage work was carried out on weekdays and weekends, and sometimes in pretty inclement weather (Figures 11 and 12). Weekends and statutory holidays were especially busy times at EgPr-2 as people who were employed at other jobs were able to drive out and assist in the salvage project. Normally, the work force varied from two to eight people.

The culture-bearing matrix was sifted through relatively fine, 6.0 by 2.9 mm diamond-shaped mesh screens to ensure a maximum recovery of material. Even the small pressure flakes, items often overlooked by those using more expeditious means, were retrieved. The view held by the senior writer is that the stations where pressure flaking was performed are just as important in interpreting the structure of a prehistoric campsite as are those workshops where crude or refined percussion flaking was carried out. Two adjacent square meters of what is thought to be part of a workshop area relating to the Fluted Point Tradition component were trowelled in order to obtain a better understanding of the occurrence of the cultural deposits at that level.

The matrix at EgPr-2 was examined by Dr. Jonathan Driver for traces of pollen grains but the results proved negative. Soil samples removed from the site were, through the arrangement of Dr. Alan Bryan, analyzed by Doug Schnurrenberger, a graduate student at the University of Alberta. The findings of these analyses are presented near the end of PART III.

General field notes were maintained on a daily basis. The artifacts were transported to Calgary for storage. Two groups of artifacts, fire broken rocks and unmodified cobbles, were not kept, but a record was made of their number and occurrence. Black and white and colour photographs were taken to illustrate various aspects of the site and the archaeological work. A surveyor's transit was made available by the

Figure 11: Excavations in progress at EgPr-2 seen from the western end of the terrace. The area in the center was eventually excavated and designated the "Block Excavation".

Figure 12: View to the west along EgPr-2 taken from the east end of the core area. The photo was taken on August 24 and shows new snow on the peak at left which is only a few kilometers away.

Department of Archaeology of the University of Calgary and was used to take elevation readings throughout the site. These readings were used to construct a contour map of the immediate site locale.

Throughout the salvage project, even after the presence of Paleo-Indian material had been confirmed, the general opinion was that to reroute the highway at this stage in the program would be very costly. With the emphasis placed on salvage excavations, the question of sampling such a site within given temporal and financial constraints was a topic which the senior writer gave considerable thought to. Early in the field program the possibility of salvaging an area of contiguous units was considered. When the Paleo-Indian workshop and fluted points were discovered, trenches and isolated units were opened up in order that the horizontal spread of the early components could be determined. Intervening units were then excavated, and by the end of the 1980 field season a block area comprising 159 contiguous square meters near the center of the core area of site EgPr-2 had been salvaged. Two square meters of this area, the west half of 13N 36W, had been tested during the 1979 excavations. A total of 41 square meters was sampled outside this block area (Figure 10). The 198 square meters salvaged during the 1980 season, combined with the 18 square meters sampled the previous fall, represent roughly one third of the endangered core area of EgPr-2.

SITE STRATIGRAPHY

On April 17, 1980 Dr. Lionel Jackson of the Geological Survey of Canada, accompanied the senior writer to the Sibbald Creek site in order to acquire a first hand assessment of its environmental setting and its deposits. The excavation units from the previous year were still open, and one objective of the trip was to obtain a clearer picture of the deposits that occurred below the culture-bearing sediments. To achieve this objective, the southwestern quadrant of unit 17N 34W was taken down below the level at which the excavations had been terminated until it was thought that the terrace gravels were intersected. Here, a thin wedge of stony grey diamicton was found to be inter-stratified between the terrace gravels and the artifact-bearing sediments. This depositional unit was not observed along the escarpment rim but in the test pit it was around 20 centimeters thick and showed a marked thickening up-slope. Jackson suggested that this diamicton, or colluvium, is material which had originated from the side of the knoll and had been deposited through slumping or solifluction.

Between 15 and 18 centimeters of sandy silt covered the diamicton and above that occurred 42 to 45 centimeters of finer textured silts in which were found the cultural remains. In general, the culture-bearing matrix throughout the site displayed no visible evidence of significant colour or texture changes, apart from thin accumulations of decomposing humus and organic matter and infrequent tree root marks (Figures 13 to 16). The composition and depth of the matrix varied between the different areas of the site. Along the rim of the escarpment near the 10N line, the accumulation of sediments over the outwash gravels was frequently less than a decimeter thick while at the extreme western end it was in the order of 15 centimeters deep. Within the Block Excavation the colluvium was usually encountered at a depth of 50 to 55 centimeters. To the east, along the 24W line, small pebbles which suggested that the underlying terrace gravels were near, began to appear between 20 and 25 centimeters below the surface.

Evidence of vertical displacement of cultural material was indicated by the distribution of two very distinctive lithic materials, a bright green quartzite and a speckled grey quartzite. Twenty-two small flakes of the green quartzite displayed a fairly even vertical distribution from the 5-10 cm level down to a depth of 40-45 cm. The speckled grey quartzite was concentrated in the 10-15 and 15-20 cm layers, but flakes of this distinctive quartzite were also recovered from the 5-10 and 35-40 cm layers. Because of their distinct colour and texture, it is likely that the flakes of these two materials were each derived from single small cobbles. This observation is supported by the very local horizontal occurrence of these flakes at the site. Further evidence of vertical movement of cultural material is indicated by the recovery from several layers of eight pieces of a partially reassembled end scraper. One of the fragments was found in the 5-10 cm layer, three came from the 10-15 cm layer, one was recovered from the 15-20 cm level, two pieces were retrieved from the 20-25 cm level, and the final fragment was found at a depth of 30-35 centimeters.

Much of the mixing could, perhaps, be attributed to natural agents, foremost of which may have been displacement caused by plants roots during normal growth, and disturbance resulting from uprooting of the trees by the wind. Many uprooted trees were present along the eastern part of the site where the soil is sandy and light. A few uprooted aspen were even cleared from the center of the site. It seems reasonable to suggest that over the past 10,000 years there were times when EgPr-2 was covered with trees and that some of these may have blown over and contributed to the mixing of the deposits. The incidence of tree-throw may, in fact, have been more frequent before

Figure 13: Ian Robertson, kneeling in SW 16N 38W, points out the level at which the Midland point was found. Note the uniform nature of the matrix. The view is upslope.

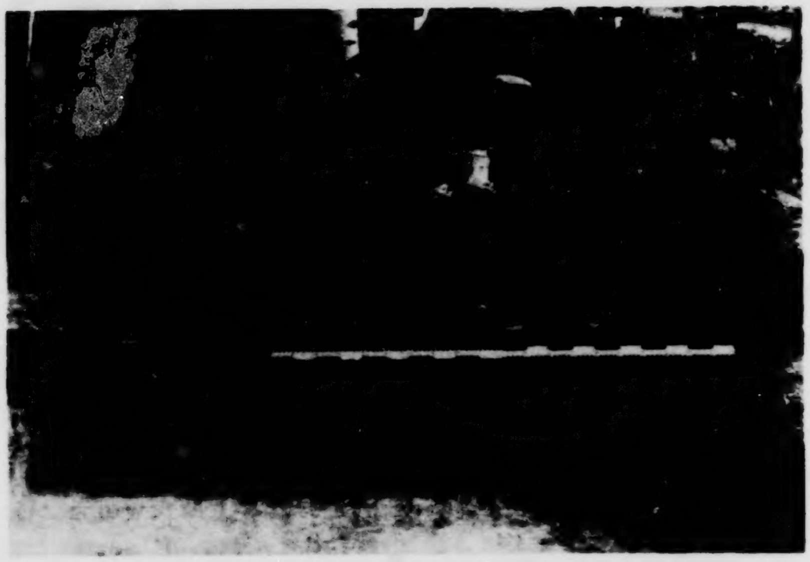


Figure 14: View east showing the shallow stratigraphy in 14N 40W and the south half of 15N 40W. The scale is two meters long. The string shows the horizontal plane.

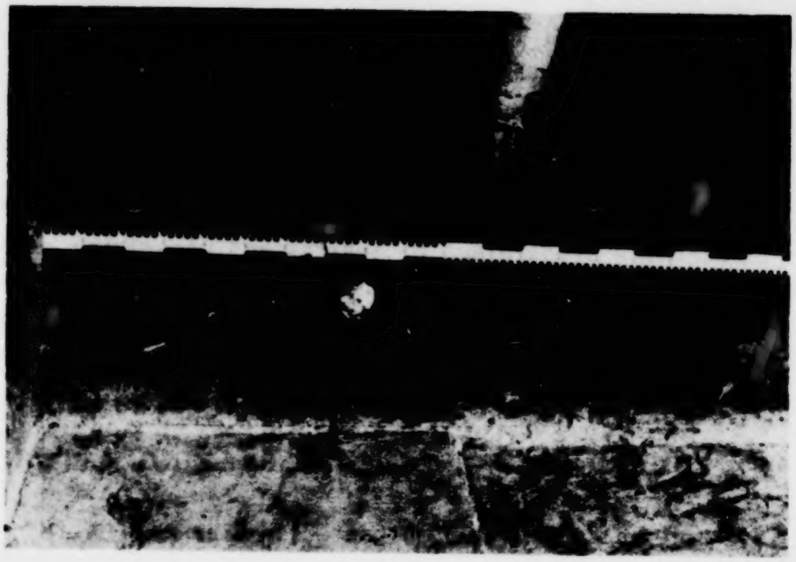


Figure 15: Profile along the east wall of unit 17N 34W. The horizontal line (string) reflects the increased slope in this part of EgPr-2. The cultural deposits here are less than half a meter deep.

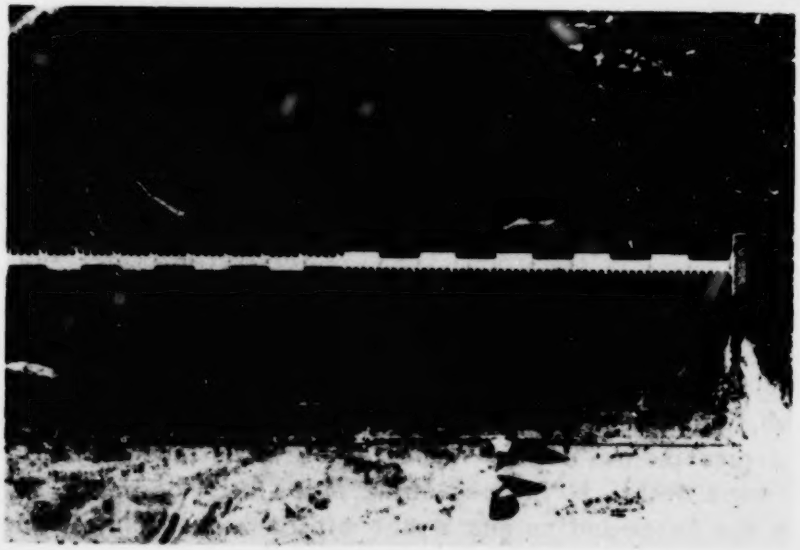


Figure 16: Profile along the north wall of unit 17N 34W showing the more horizontal east-west aspect of the cultural deposits. The lower string is at 40 centimeters below surface.

the increased accumulation of finer sediments provided a better anchor for the trees. Other possible sources of mixing may have been animal burrows, but very few were observed during the excavations.

The deeper part of the site contained close to a half a meter of culture-bearing deposits. Given a period of around 11,000 years the average rate of deposition here was in the order of a centimeter for every 250 years. In the shallow parts of the site the rate was, of course, much less. Heavy traffic throughout the area and disturbance of the terrain through the preparation of hearths and processing or storage pits would certainly have brought about displacement of campsite refuse which lay at or near the surface. Perhaps this may explain why no intact hearths were discovered even though a large quantity of fire broken rocks was unearthed.

NATURE AND SOURCE OF THE CULTURE-BEARING MATRIX

A complete column of soil was collected in five centimeter increments from the southeast corner of the northwest quadrant of unit 17N 40W down to below the bottom of the culture-bearing horizon. Doug Schnurrenberger, a graduate student at the Department of Anthropology, University of Alberta, carried out a particle size analysis of the samples. He also examined the soil for traces of volcanic ash. A summary of the soil analyses showing the granulometric composition of the matrix for the various levels is presented in Table 2 and illustrated graphically in Figure 17. The more detailed data from the sieve and hydrometer analyses are presented in Table Ap-1, Appendix I.

Several findings of the soils analyses depicted in Figure 17 are worth pointing out. The high proportion of clay in the 55-60 cm level marks the position of the underlying wedge of colluvium which separates the culture-bearing deposits from the terrace gravels. It is suspected that this colluvium was derived from the grey till unit that underlies a light brown till in the vicinity of Jumpingpound Creek.

The proportion of silt remains relatively high from the 50-55 cm to the 35-40 cm levels. This portion of the profile, on the basis of associated projectile points and supported by three radiocarbon dates (covered in some detail at the beginning of PART V on page 122), encompasses the Paleo-Indian and Mount Albion zones, and, as such, appears to correspond well with the period of climatic amelioration mentioned earlier in the section on the paleo-environmental situation. This climatic period, with one minor interruption, spanned the interval from roughly 10,500 to shortly after the deposition of the Mazama volcanic ash (MacDonald 1980:63-66). Schnurrenberger (personal communications 1981) reported encountering volcanic ash in very low amounts in the 30-40 cm level. Because of its stratigraphic position in the profile, one can almost automatically conclude that this was the Mazama tephra.

Table 2: Summary of the hydrometer and sieve analyses on the soil column from the northwest quadrant of unit 17N 40W

	Estimate 1			Estimate 2		
Depth	Sand	Silt	Clay	Sand	Silt	Clay
20-25	29.30	47.62	23.07	25.68	51.25	23.07
30-35	32.67	42.30	25.02	32.74	42.24	25.02
35-40	32.14	47.96	19.90	29.36	50.74	19.90
40-45	27.51	53.98	18.52	26.74	54.75	18.52
45-50	25.79	59.14	15.07	25.80	59.13	15.07
50-55	28.65	60.31	11.04	24.97	64.00	11.04
55-60	15.47	54.21	30.32	15.38	54.30	30.32

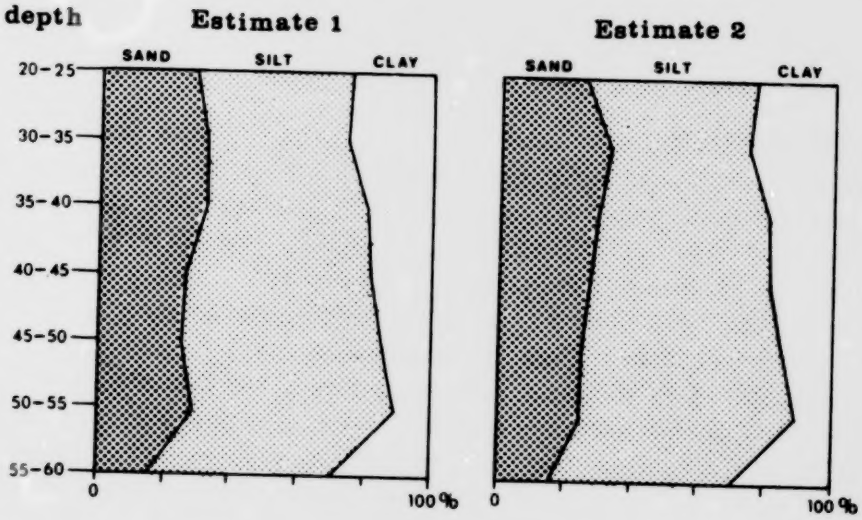


Figure 17: Graphic representation of data given in Table 2

The increase in clay and silt in the 30-35 cm level seems to correspond in the profile with the time when climatic conditions are reported from pollen studies to have deteriorated shortly subsequent to the deposition of the Mazama ash. It is not known whether this represents an _in situ_ development of clays under moister conditions, or the movement downslope of fines as a result of increased precipitation. Since the upper 20 centimeters of the profile were not examined it is not known if the trend set in the 30-35 cm level continued unchanged until the present.

PART IV: THE CULTURAL MATERIAL FROM EgPr-2

INTRODUCTION

As of the end of the 1980 archaeological program, 8,755 catalogue entries were recorded for EgPr-2. This total also includes all of the artifacts that have been collected during the previous years. Identifiable artifacts were recorded individually while cultural material sharing similar characteristics and having the same provenience, for instance, burnt bone scraps or unmodified flakes and flake fragments of a distinct lithic type, were entered as a group under one catalogue number.

For purposes of analysis and presentation the data was distinguished as to whether it was prehistoric or historic. Identifiable faunal remains were restricted to the upper few layers of the site. Since they were amenable to the same analytical treatment irrespective of their cultural provenance, the faunal remains are dealt with in a separate section.

THE PREHISTORIC CULTURAL MATERIAL

> The Centipede was happy quite
> Until one day the toad - for fun -
> Asked her which leg went after which,
> Which brought her mind to such a pitch
> She lay distracted in a ditch
> Considering how to run (Calderon 1936:57).

The greatest proportion of archaeological remains retrieved from EgPr-2 comprised prehistoric cultural material. This consists of the campsite debris and features that were left behind by hunters and their families during their use of the area as a habitation site over the past 10,000 or more years. The quantity and range of material was quite overwhelming. There are projectile points, unifacially and bifacially flaked cutting and scraping tools, gravers, drills, and perforators, choppers, hammer and anvil stones, a wide array of chipping detritus and cores, native ceramics, burnt and unburnt bone scraps and fire broken rocks. The variety of projectile points indicates that a number of different peoples had visited the site, the earliest presumably being hunters of the Fluted Point Tradition.

The bulk of the cultural material came from the Block Excavation, a large section of contiguous units excavated roughly in the center of the core area of the site (Figure 10). It is the material from here that provides the best indication of the vertical (temporal) nature and horizontal distribution of the cultural material. Early in the analysis the possibility of using a computer to help sort the data collected from the Block Excavation was investigated but the tremendous expenditure of time and money was considered to be too prohibitive. However, in retrospect, this route may have been the wiser one. As it turned out, the task of sorting the mass of information was largely performed by hand and was found to be very time consuming.

Not all of the units within the Block Excavation were initially considered in reconstructing the vertical and horizontal distributions of the prehistoric material. For instance, debitage, burnt bone, and fire broken rock were first tabulated and mapped only for those 133 square meters located along the 14N to 17N lines. South of this, along the 13N line, and particularly the 12N line, the culture-bearing deposits thinned out considerably, and it is believed that aside from the compressed stratigraphy, there was much more mixing of components here. However, the horizontal coverage was later extended to include even this shallow portion of the Block Excavation.

DEBITAGE

There were 17,295 flakes and flake fragments retrieved from the 133 square meters of the Block Excavation. This is the debitage which had been produced by the manufacture or resharpening of tools and points and includes prepared and unprepared platform percussion flakes, pressure flakes, and workshop shatter. Eighteen different varieties of lithic material were identified, although the number could have been expanded if finer differentiations had been made on the basis of subtle changes in colour or texture. On the other hand, the number could have been greatly reduced if the distinctions had been made only between major categories of lithic materials such as cherts, siltstones, quartzites, obsidian and quartz.

The relative frequencies of the flakes and flake fragments retrieved from the section of the Block Excavation located north of the 13N units are shown in Figure 18. With the exception of the "Swan Valley" chert, obsidian and crystal quartz, the raw lithic material used by the prehistoric artisans may have been obtained from within a few kilometers of EgPr-2.

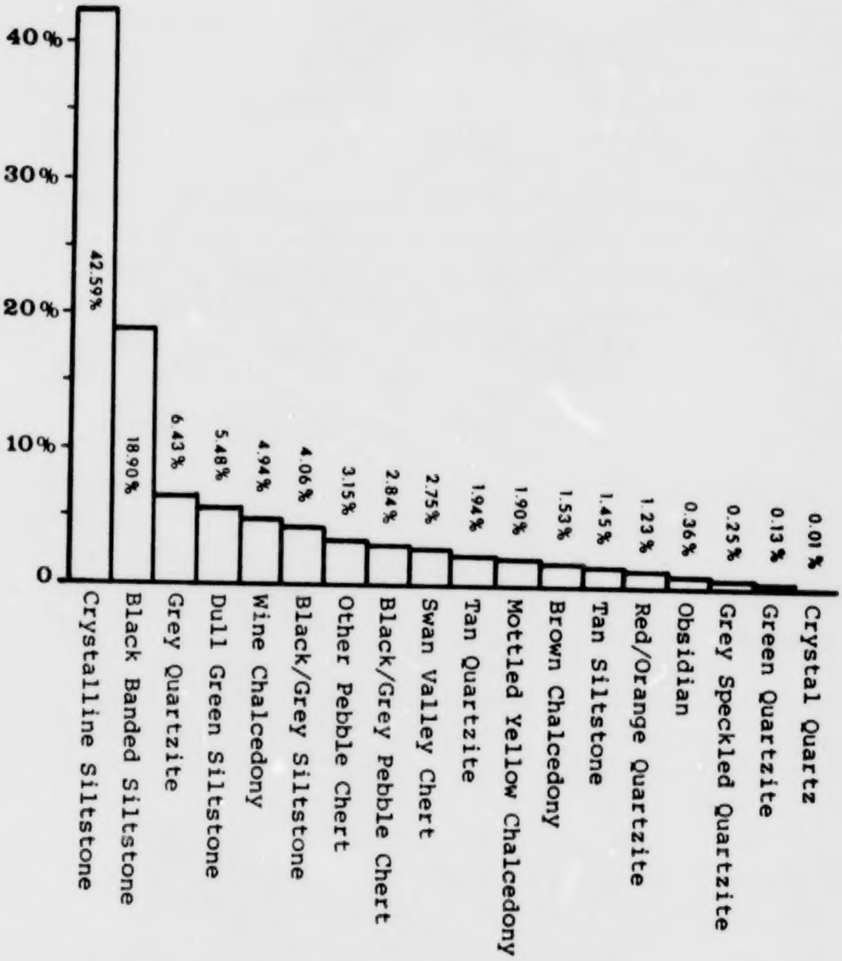


Figure 18: Relative frequencies of all lithic debitage recovered from the Block Excavation.

The most common lithic material utilized at EgPr-2 is a very compact siliceous siltstone that could easily pass for a very fine-grained argillite. It ranges in colour from dull green and metallic grey to dark grey and black. It is quite homogeneous in texture and the better quality examples display good conchoidal fracture. It is fairly tractable even without thermal alteration, and it is likely that much of it was not heat treated. The most striking characteristic of this siltstone is that it contains tiny crystals, possibly of quartz. The senior writer has seen angular blocks of this lithic material along the banks of the Highwood and Elbow Rivers to the south, as well as in the vicinity of Sibbald Flat and Bryant Creek. It appears that this crystalline siltstone was derived from the local Cretaceous bedrock formations. The fact that 42.50 percent of the lithic detritus recovered from the Block Excavation was crystalline siltstone reflects both the preference for this material and the large amount of wastage produced during the manufacture of a wide range of artifacts, from crude bifaces to delicate projectile points.

The second most popular lithic type used by the past inhabitants at EgPr-2 is a black banded siltstone quite similar to that which occurs in abundance in the Kananaskis country to the southwest. It varies in colour from dark grey to black with the bedding planes showing up as light grey bands. Debitage of this black banded siltstone made up 18.90 percent of the waste flakes recovered from the deeper 133 square meters of the Block Excavation (Figure 18).

A variety of other siltstones, some fine-grained and others having the texture of fine sandstone, was used by the prehistoric artisans (Figure 18). It was noticed during the excavations that the south-facing slope of Sibbald Flat is strewn with cobbles of sedimentary origin, many of them comparable to the siltstones which appear at EgPr-2.

Quartzites are quite conspicuous in the outwash gravels near the site, but they appear to have been largely avoided as a suitable type of raw lithic material. Only around 10 percent of the debitage from the Block Excavation was of quartzite. The pebble cherts and chalcedonies occur in the local gravels and in the Blairmore conglomerate which outcrops to the west and southwest of Sibbald Flat. The chert pebbles extracted from bedrock sources near Elbow River by the senior writer included some that were opaque light grey in colour and semi-translucent dark brown varieties. The chert could be matched with flakes recovered from EgPr-2. Badly fractured pebble cherts were observed among the gravels that are exposed along the terrace rim just a few steps from the site.

A small proportion of the cherts (2.75%) appears similar to lithics that the senior writer has encountered in sites in the southeastern part of Alberta, and in considerable abundance at sites in western Manitoba. In Manitoba this material is commonly referred to as Swan River or Swan Valley chert (Campling 1980:291-299). Some of it could have been derived from till sources in the southern part of the province and carried to the Sibbald Creek site by hunters moving in off the Plains. It is also possible that small quantities of this chert occur in the Blairmore pebble conglomerate since this bedrock formation does contain a wide range of cherts.

Two lithic materials which are certainly foreign to the Sibbald Flat area, but were likely obtained from Rocky Mountain sources, are obsidian and crystal quartz. Both of these materials occurred in the Block Excavation in diminutive proportions (0.36% of obsidian and 0.01% of crystal quartz) but their very presence at EgPr-2 is significant for it indicates direct or indirect cultural connections with the interior areas of the Rocky Mountains. The crystal quartz may have been obtained from cavities within the Paleozoic limestones that outcrop within the Rocky Mountain Front Range. Two varieties of obsidian, a dark opaque and a semi-translucent type, are represented at EgPr-2. They may have originated from sources in the interior part of British Columbia, Idaho, or the Yellowstone cliffs in northwestern Wyoming. It is expected that analysis will eventually be carried out to determine the source or sources of this material.

The vertical distribution of the debitage recovered from 133 square meters of the Block Excavation is shown graphically in Figure 19. The highest proportion of flakes and fragments (20.60%) came from the 40-45 centimeter layer, much of which was associated with a Paleo-Indian (Fluted Point Tradition?) workshop. It is interesting to note that a reduction in the proportion to 7.43 percent in the 30-35 centimeter layer occurs where, on the basis of diagnostic artifacts types and the occurrence of volcanic ash, the Altithermal Period may fit stratigraphically.

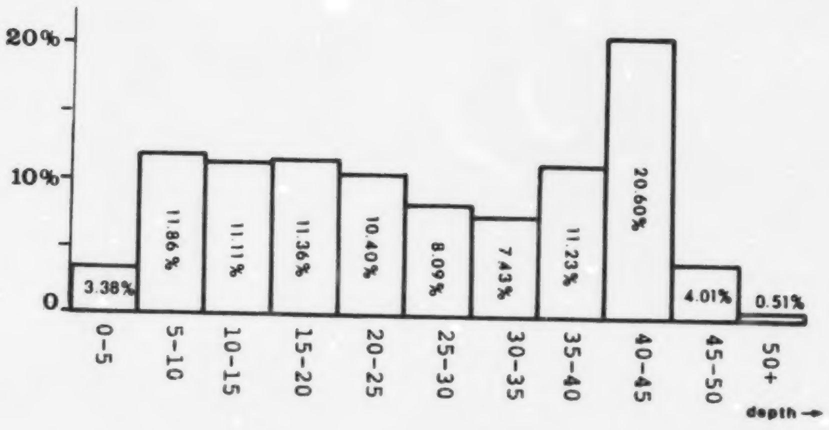


Figure 19: Percentage distribution of the 17,295 flakes and flake fragments recovered from the Block Excavation.

A more detailed distribution of chipping detritus from the Block Excavation by material type is depicted graphically in Figure 20. The total number of flakes and flake fragments recovered is shown below each material type in the illustration.

There are several interesting observations regarding the relative vertical distribution of lithic types that warrant some comment. As noted previously, the green and speckled grey quartzites, because of their distinctiveness and very localized horizontal distributions, were most certainly detached from single small cobbles. However, the relatively broad vertical dispersion of flakes of these two materials is a good indication that some mixing of deposits had occurred. The dull green siltstone and the wine and mottled yellow chalcedony debitage was associated mainly with very localized workshops where one or two cobbles of these lithics had been reduced. With regard to the two most common lithic types found at EgPr-2, it is interesting to note that the crystalline siltstone was preferred by the earlier occupants whereas the black banded siltstone was more popular in the later history of the site.

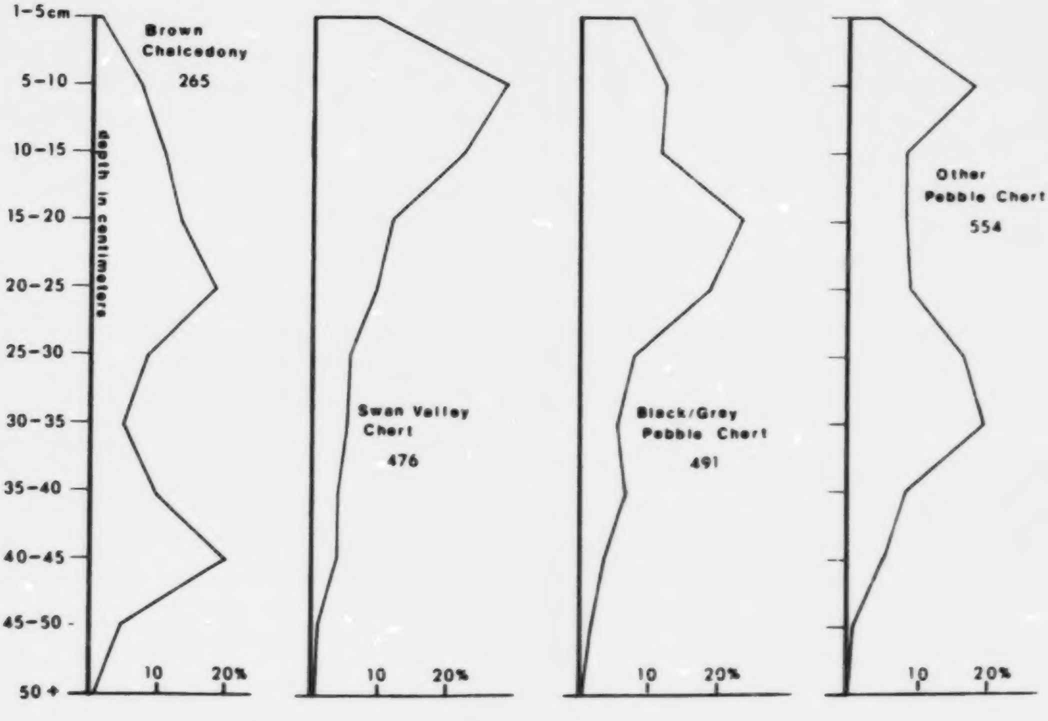


Figure 20: Vertical distribution of debitage of various lithic types recovered from the Block Excavation.

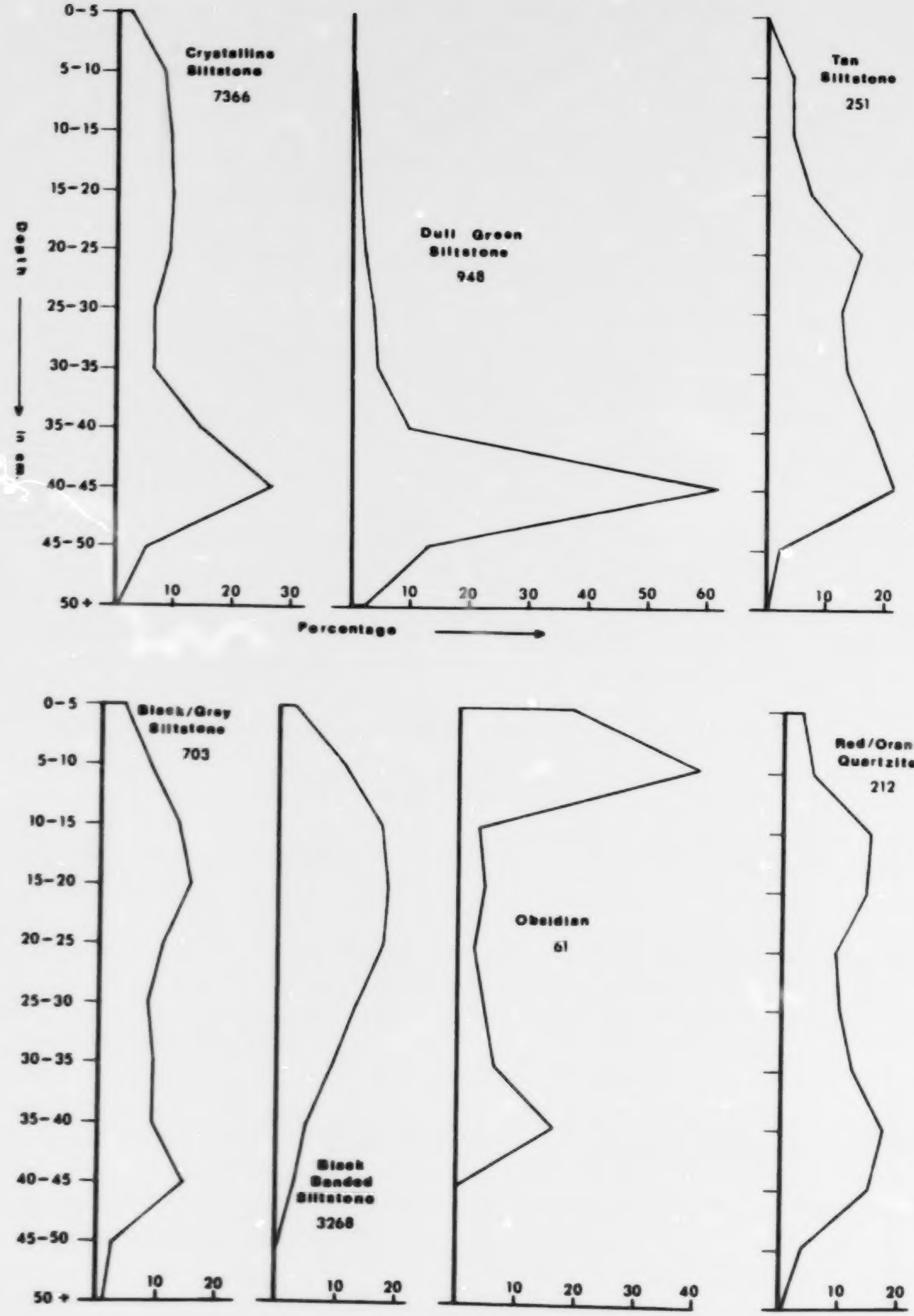


Figure 20: continued.

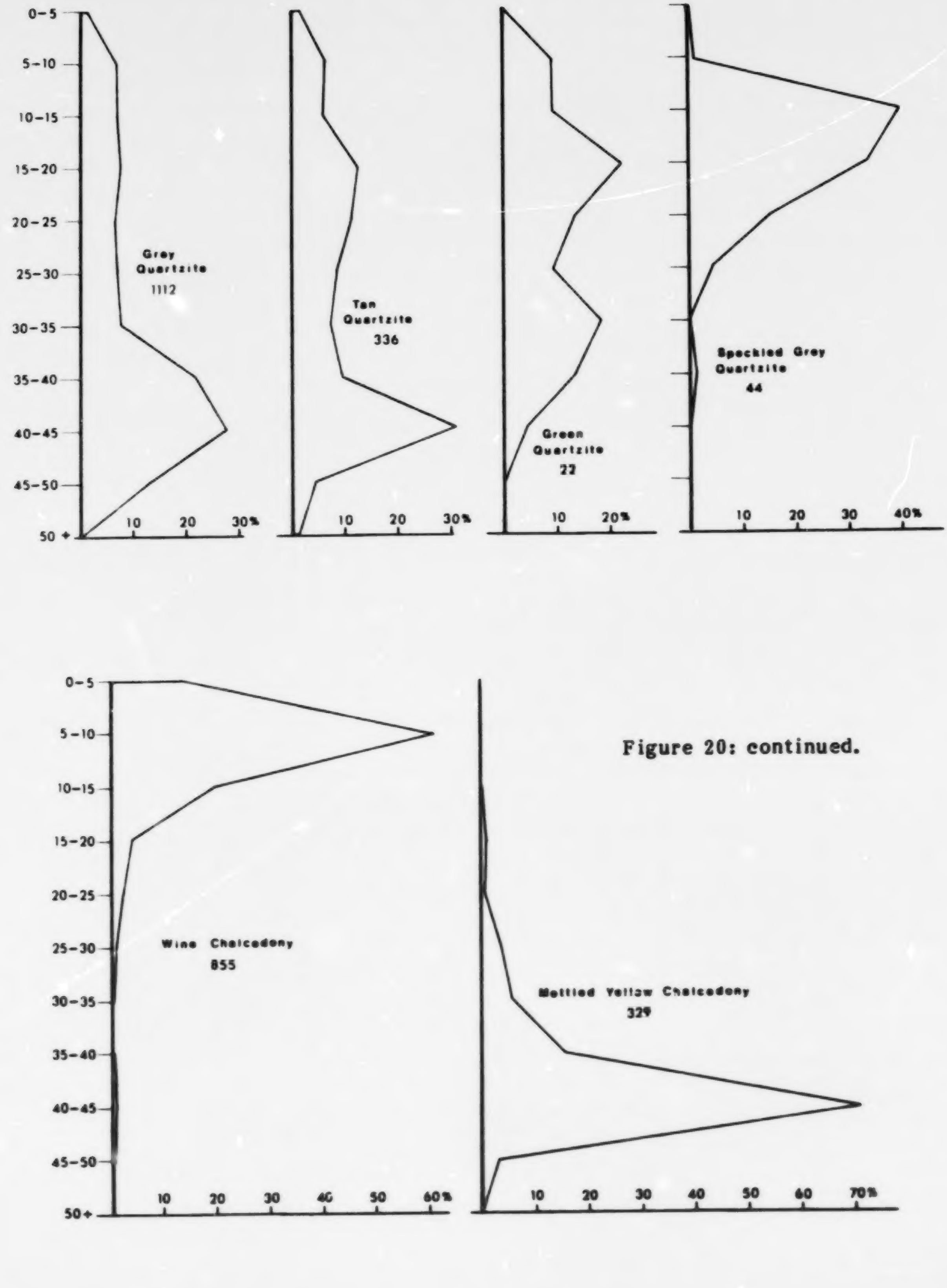


Figure 20: continued.

The bimodal vertical distribution of materials such as brown chalcedony, pebble cherts, grey siltstones, and red-orange quartzite reflects more intense periods of occupation during the Paleo-Indian and Late Middle Prehistoric to Late Prehistoric times, a fact reflected in Figure 19. The bimodal distribution of obsidian debitage suggests that hunters from the Rocky Mountain interior had visited Sibbald Flat directly or by way of the Plains during the Altithermal and the Late Prehistoric periods.

Horizontal concentrations of chipping detritus were plotted for each five centimeter layer for the whole of the Block Excavation on distribution maps. On the maps it was possible to discriminate local lithic workshops. These distribution maps illustrate the occurrence of other types of refuse, tools and projectile points, so their interpretation will be covered in detail in a later section.

PROJECTILE POINTS

There were 146 projectile points and identifiable point fragments discovered at the Sibbald Creek site; of these, 99 came from the Block Excavation. Quantitative and qualitative attributes of all the specimens are presented in Tables Ap-2 and Ap-3, Appendix I. The points recovered from the Block Excavation were arranged in terms of their stratigraphic provenience and the specimens from each layer were sorted according to cultural types. All measurements are in millimeters. Asterisks denote incomplete readings, as in the case of broken specimens. A dash is used to indicate that a reading is not applicable, as in the cases where the attribute is absent because of stylistic reasons, or where it is not determinable because the specimen is fragmentary.

For purposes of description, the projectile points from both inside and outside the Block Excavation were visually sorted according to distinct types, ones which have already been established in the archaeological literature. For a site such as EgPr-2 where the stratigraphy is fairly compressed and where instances of vertical displacement of artifacts have been clearly demonstrated, the assignment of points to a specific type may, in some cases, be quite tenuous. Photographs of many of the points and point fragments have been provided in this report to give the reader the opportunity to assess the visual identifications.

Plains Side-Notched (N=16)

Twelve examples thought to be Plains Side-Notched were recovered from the Block Excavation and four others were found outside this area. The two base fragments (Cat. Nos. 4642 and 7670) are crudely made of quartzite and their identification as Plains Side-Notched points may be open to question. As mentioned previously, selected attributes are given in Tables Ap-2 and Ap-3 in Appendix I. The Plains Side-Notched points are listed below in Table 3 and illustrated in Figures 21, 22 and 23.

Table 3: Plains Side-Notched points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
3695	14N 42W SW 5-10	grey quartzite	21 f
3834	14N 43W NE 0-5	red shale (siltstone)	21 e
4265	15N 34W NW 5-10	black banded siltstone	21 l
4642	15N 36W NW 15-20	grey quartzite	22 a
6620	16N 37W SW 0-5	white Swan Valley chert	21 h
6630 6914	16N 37W SW 5-10 16N 38W NE 5-10	crystalline siltstone	21 k
6631 6791	16N 37W SW 5-10 16N 38W SE 5-10	crystalline siltstone	21 i
6781	16N 38W SE 5-10	crystalline siltstone	21 c
6929	16N 38W NE 15-20	grey banded siltstone	21 j
6978	16N 38W NW 0-5	black pebble chert	21 d
3640	14N 42W SE 0-5	white Swan Valley chert	21 g
7670	17N 34W SE 5-10	tan quartzite	22 b
342	13N 30W NE 0-5	grey chert	23 d
424	12N 24W SW 15-20	black chert	23 j
2102	13N 44W NW 0-5	black chert	23 i
8702	surface, west end	grey pebble chert	23 c

Plains Triangular (N=3)

Three small, straight-based triangular points may belong to the Late Prehistoric Period Plains Side-Notched Point Tradition. Aside from a lack of side notches, they appear to be finished points. None exhibits any trace of basal grinding. The points are summarized in Table 4 and more details are available in Tables Ap-2 and Ap-3, Appendix I.

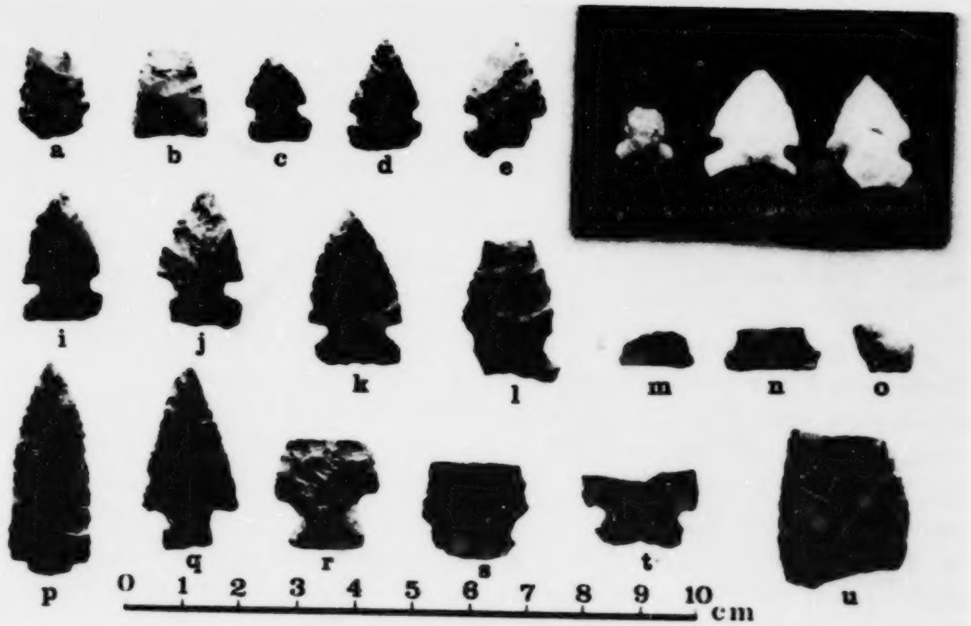

a
b
c
d
e
i
j
k
l
m
n
o
p
q
r
s
t
u
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 21: Projectile points recovered from the upper levels of the Block Excavation.

a
b
c
d
e
f
g
h
i
j
k
l
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 22: Projectile points recovered from the upper levels of the Block Excavation.

Table 4: Plains Triangular points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
5963	16N 34W SW 15-20	black banded siltstone	21 b
1332	13N 30W NW 0-10	grey chert	23 b
2207	14N 29W SW 0-5	black banded siltstone	23 h

Prairie Side-Notched (N=7)

Seven convex-based points are tentatively suggested to be Prairie Side-Notched examples. One of the points (Table 5) is made of dark opaque grey obsidian. It had been reworked to the extent that it may no longer have been functional as a projectile point. Two other points were found in conjoining pieces, and it appears that both may have broken during the manufacturing stage. Only two of the points (Cat. Nos. 2179 and 3056) displayed pronounced grinding of the base. The points appear similar to the Lewis Narrow Rounded Base variety of Kehoe's Small Side-Notched Point system (Kehoe 1973:Figure 6).

Table 5: Prairie Side-Notched points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
2751 2765	14N 37W SW 10-15 14N 37W SW 15-20	black banded siltstone	24 i
3056	14N 38W NW 20-25	fine grey quartzite	24 a
3209	14N 39W NW 10-15	black banded siltstone	24 j
3535	14N 41W NE 5-10	crystalline siltstone	21 s
8420	17N 39W SE 15-20	weathered siltstone	24 b
2179	14N 27W NW 0-5	crystalline siltstone	23 m
309	12N 47W SE 10-15	opaque grey obsidian	23 l

Besant (N=13)

Six points, suggested to be Besant, were recovered from the Block Excavation and a further seven were found in shovel tests and excavation units located in the eastern part of the site. In comparison to the rest, one petrified wood example and two quartzite points (Cat. Nos. 3303, 344, and 155) were relatively massive specimens. They are respectively shown in Figures 22 e and 22 g and 25 k. Metric and qualitative data on these and the other Besant points is presented in Tables Ap-2 and Ap-3 in Appendix I; a summary is given in Table 6.

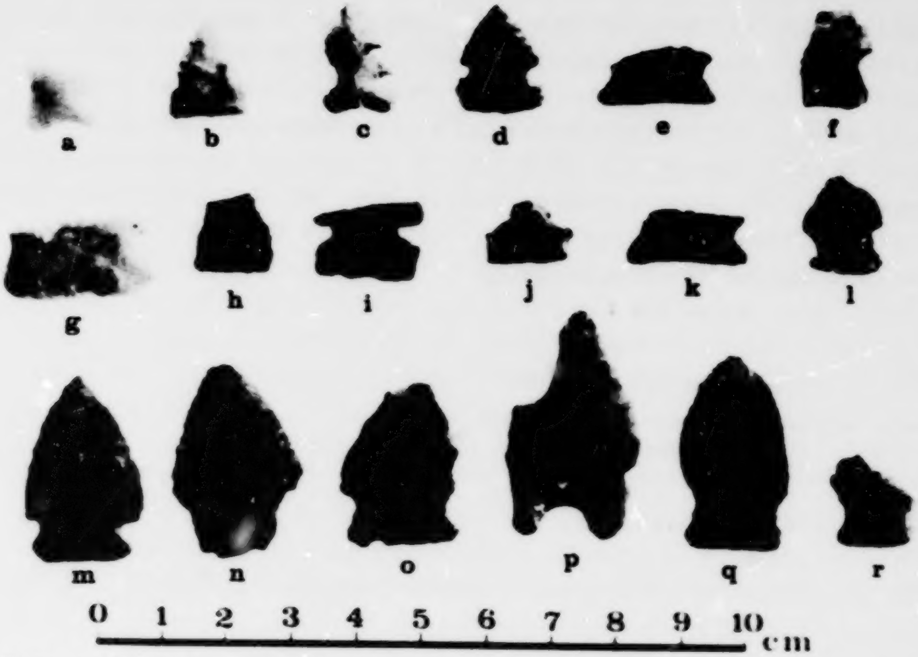

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
r
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 23: Late and Middle Prehistoric Period projectile points recovered from outside the Block Excavation.

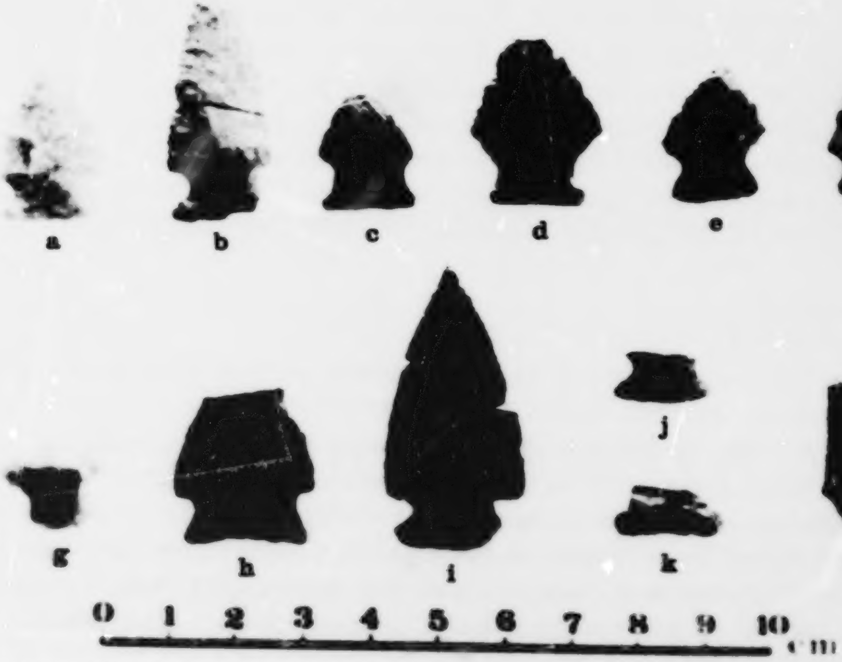

a
b
c
d
e
f
g
h
i
j
k
l
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 24: Late and Middle Prehistoric Period projectile points recovered from the upper layers of the Block Excavation.

Six, or possibly eight, of the points are represented by smaller, relatively well made, corner-removed specimens (Figure 22 c; Figure 23 e, f, k and o; Figure 24 h; and Figure 25 k). Bases vary from straight to slightly convex. Some of the specimens exhibit considerable basal edge grinding. One wine chalcedony example (Figure 22 c) has been reworked into an end scraper. It came from the vicinity of a large workshop area of similar chalcedony. The average neck width of these six small Besant examples is 13.4 mm. These points appear similar to the Besant Variety 3 recovered by Forbis from the Old Women's buffalo jump near the town of Cayley some 80 kilometers south of Calgary (Forbis 1962:106 and Figure 14 B).

Table 6: Besant points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
344	13N 36W SW 15-20	tan quartzite	22 g
2476	14N 35W NW 10-15	wine chalcedony	22 c
2605	14N 36W NW 5-10	black banded siltstone	21 m
3303	14N 40W SW 20-25	petrified wood	22 e
3458	14N 41W SE 25-30	grey pebble chert	25 k
6792	16N 38W SE 10-15	crystalline siltstone	24 h
10	Shovel Test No. 1	black banded siltstone	23 o
11	Shovel Test No. 1	grey pebble chert	
155	14N 30W SE 10-15	light tan quartzite	23 g
1223	13N 24W NW 20-25	black banded siltstone	23 e
1224	13N 24W NW 20-25	black banded siltstone	23 k
2211	14N 29W NW 5-10	black banded siltstone	23 f
2270	14N 30W NW 10-15	black siltstone	23 n

Pelican Lake (N=11)

Seven small corner-notched or side-removed points discovered in the Block Excavation and four others found outside this area are tentatively suggested to belong to the Pelican Lake complex. A few examples may be Besant or Oxbow variants, or perhaps Mount Albion points. The generally shoddy workmanship appears to reflect (and this is evident in most of the projectile points from the site) the rather poor quality of the local lithic materials. Only two of the points (Cat. Nos. 186 and 2152) have narrow corner notching and attendant barbs. One other example (Cat No. 5890) may have had pronounced barbs but these have since broken off. A summary of the Pelican Lake points from both areas of EgPr-2 is presented below in Table 7 and selected qualitative and quantitative attributes are given in Tables Ap-2 and Ap-3 in the appendix at the end of the report.

Table 7: Pelican Lake points from EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
336	12N 36W NW 0-10	black banded siltstone	26 c
763	12N 41W SE 10-15	black pebble chert	26 d
2036	13N 41W NW 10-15	black chert	24 f
3553	14N 41W NE 20-25	black banded siltstone	21 q
4335	15N 35W SE 20-25	crystalline siltstone	24 c
5890	16N 34W SE 15-20	crystalline siltstone	24 e
7098	16N 39W SW 15-20	green pebble chert	
186	14N 30W 5-10	black banded siltstone	26 a
752	12N 36W NW 20-25	crystalline siltstone	26 f
954	12N 48W NW 25-30	grey chalcedony	26 e
2152	14N 27W SW 15-20	grey chert	26 b

Hanna (N=1)

The only Hanna example comprised a base portion (Figure 21 r) which was found in the 10-15 cm layer of the southeast quadrant of 14N 40W. It is made from a dull green siltstone. Both the lateral edges and the base display marked grinding. Being 10.0 mm wide at the neck, it is quite comparable in this attribute to the smallest Pelican Lake specimens.

Duncan (N=10)

Ten Duncan points were retrieved from EgPr-2; eight of these came from the Block Excavation. Three of the points (Figure 22 h, i and k) are complete and another one (Figure 23 p) is slightly damaged along the edge but could still have been functional. The tip of the red quartzite point (Figure 22 i) is blunted and displays marked smoothing; it appears to have been used as a drill tip.

The configuration of the bases varies significantly. Two examples (Figure 22 d and Figure 23 p) approach the McKean style; another one (Figure 22 j) resembles the Hanna style; and a stubby, reworked specimen (Figure 22 k) could easily have been included with the Oxbow points. Two possible Duncan points (Cat. Nos. 7014 and 7418) are represented only by small portions of the base and, thus, are not very diagnostic. The neck width of the Duncan points varies from 9.8 mm for a crude quartzite example (Figure 23 a) to 18.0 mm for a broad, reworked crystalline siltstone specimen (Figure 22 i). The average width for the 10 Duncan points is 14.53 mm.

A summary of the Duncan points is presented below in Table 8. The examples recovered from the Block Excavation are listed first. Metric and qualitative data on all these examples is contained in Tables Ap-2 and Ap-3, Appendix I.

Table 8: Duncan points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
2573	14N 36W SW 15-20	green pebble chert	22 j
2948	14N 38W SW 5-10	crystalline siltstone	22 i
4417	15N 35W NE 10-15	red quartzite	22 l
5715	15N 41W NW 15-20	black banded siltstone	22 d
7014	16N 38W NW 30-35	grey quartzite	
7030	16N 39W SE 10-15	black banded siltstone	22 k
7418	16N 41W SW 10-15	black banded siltstone	
8542	17N 40W SE 5-10	grey pebble chert	22 h
39	12N 24W NE 5-10	black banded siltstone	23 p
82	12N 24W NW 5-10	grey quartzite	23 a

Oxbow (N=26)

The relative abundance of Oxbow points at EgPr-2 reflects the intense occupation of the site during the Middle Prehistoric Period. Twenty-six projectile points were recovered; all but five of these came from the Block Excavation. Four of the Oxbow points are complete, two are complete but reworked, and the remaining 20 are represented by identifiable base fragments. In a few instances the assignment to the Oxbow type may be tenuous.

The sample of points is sufficient to provide an indication of the vertical distribution of Oxbow material in the central part of EgPr-2. Within the Block Excavation, five of the Oxbow points were found in the 10-15 cm layer, five each in the 15-20 and 20-25 cm layers, one at 25-30 cm, four in the 30-35 cm layer and one in the 35-40 cm horizon (Table 9). On the basis of this distribution, the greatest concentration of Oxbow cultural material should be expected in the 15-25 cm zone.

Table 9: Oxbow points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
682	12N 36W SW 10-15	crystalline siltstone	26 k
346	13N 36W SW 20-25	black banded siltstone	27 l
347	13N 36W SW 20-25	dull green siltstone	27 o
1377	13N 35W NE 10-15	black banded siltstone	27 p
2798	14N 37W NE 10-15	crystalline siltstone	21 t
3057	14N 38W NW 20-25	brown chalcedony	27 n
3099	14N 39W SE 15-20	crystalline siltstone	27 d
3317	14N 40W SW 30-35	blue-grey chert	27 g
3365	14N 40W NE 35-40	black banded siltstone	27 e
*4400	15N 35W SW 30-35	black banded siltstone	27 q
4735	15N 37W SW 10-15	black pebble chert	
4916	15N 38W SE 10-15	red jasper	
5106	15N 38W NW 30-35	grey pebble chert	27 i
5254	15N 39W NE 25-30	black banded siltstone	27 k
5349	15N 40W SE 20-25	black banded siltstone	27 f
5386	15N 40W SW 15-20	tan pebble chert	27 h
5587	15N 41W SE 20-25	crystalline siltstone	24 k
5754	15N 42W SE 15-20	green pebble chert	27 b
6117	16N 34W 15-20	speckled grey quartzite	27 a
6574	16N 37W SE 15-20	black pebble chert	27 j
7262	16N 40W SE 30-35	wine chalcedony	27 m
83	12N 24W NW 15-20	crystalline siltstone	26 i
352	12N 24W SE 0-5	wine chert	26 j
1193	13N 24W NW 10-15	crystalline siltstone	26 h
1309	13N 30W SW 15-20	blue-grey chert	26 g
2244	14N 30W NE 10-15	fine grey siltstone	26 l

*Specimen 4400 may be the base of a hafted knife rather than a point.

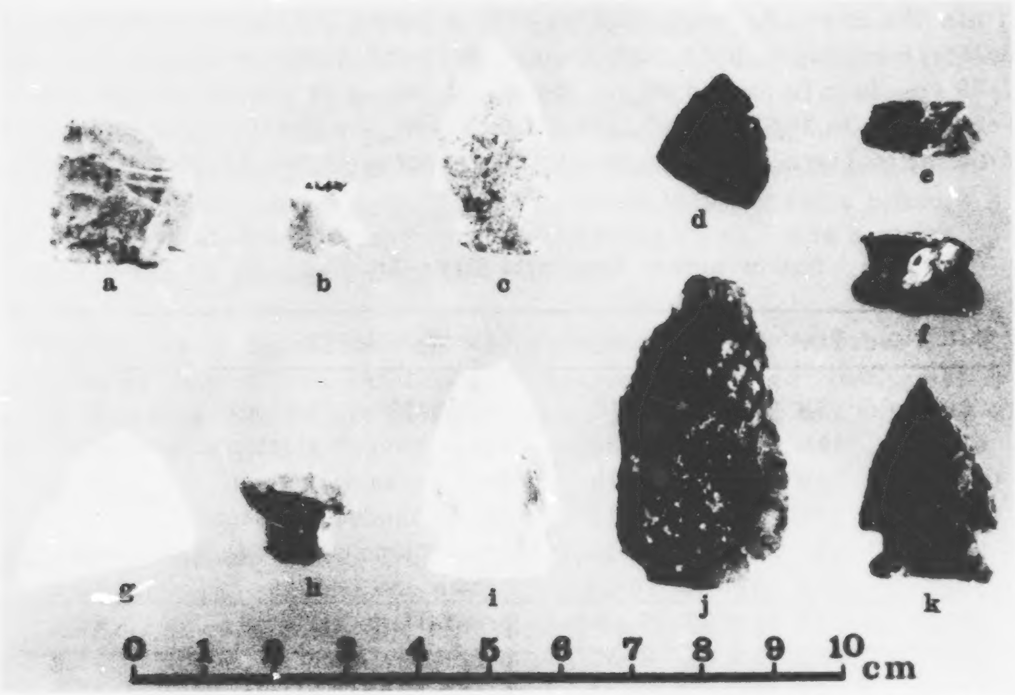

a
b
c
d
e
f
g
h
i
j
k
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 25: Three possible Paleo-Indian point fragments (a, d and g), six Mount Albion points (b, c, e, f, h and i), a Besant point (k), and an unidentified mid-section (j). All are from the Block Excavation.

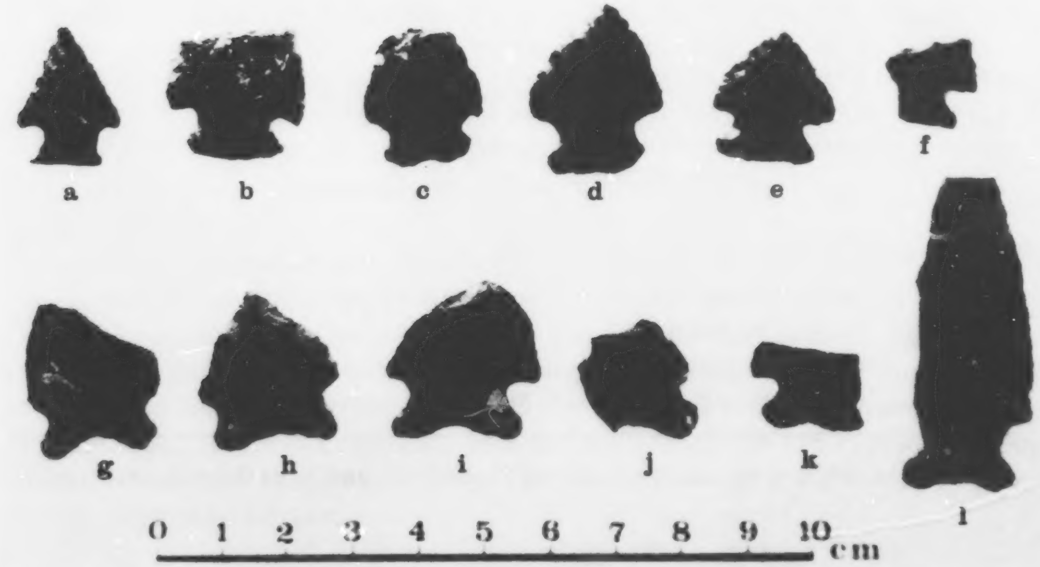

a
b
c
d
e
f
g
h
i
j
k
l
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 26: Pelican Lake points (upper row) and Oxbow points (bottom row) recovered from outside the Block Excavation.

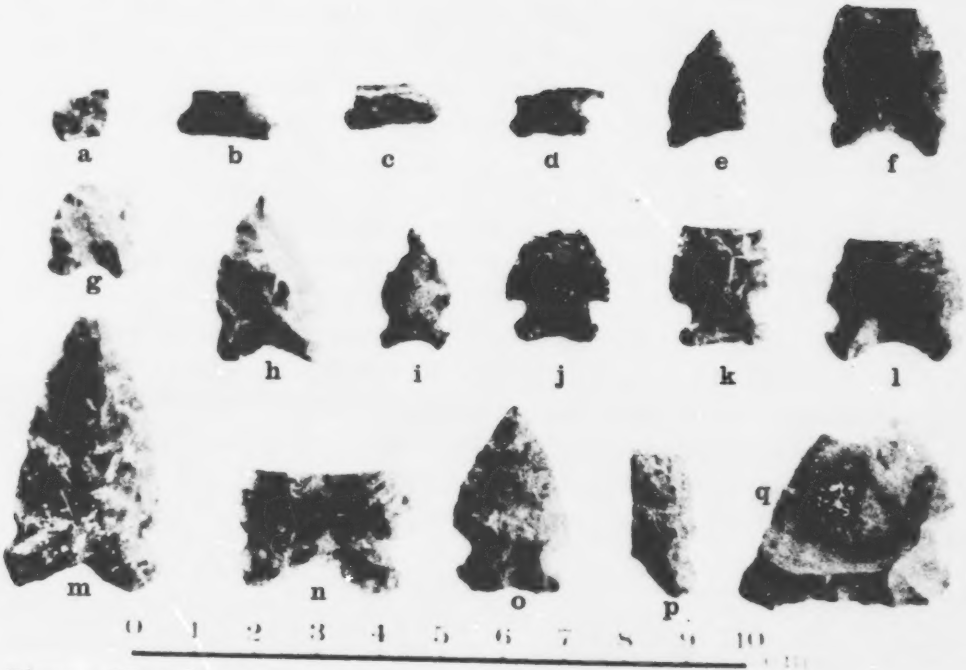

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 27: Oxbow points and a hafted biface fragment recovered from the Block Excavation at EgPr-2.

In terms of lithic material, points made of black banded and crystalline siltstones are equally represented with six examples, or 23 percent, each. There are six chert or chalcedony examples and five that were manufactured from various pebble cherts or very fine siltstones. The only quartzite example, of which only a small edge-ground ear portion was found (Figure 21 o), was made of a speckled grey variety of this lithic material. The vertical distribution of debitage of this distinctive speckled grey quartzite is presented in Figure 20, and shows that the greater proportion of the flakes occurred in the 10-20 cm zone.

The craftsmanship reflected by the quality of the points was quite variable. Two small points (Figure 27 e and i) and a somewhat larger one (Figure 27 f) appear to have been hastily fabricated simply by edge retouching thin flakes. The remaining examples display overall bifacial pressure flaking. Only a few examples (Figure 27 l and o) exhibit marked basal thinning.

The size range of the Oxbow points is quite variable (Figure 26 g-l and Figure 27 a-q). For the bifacially flaked points, the neck width ranges from 13.5 mm for Cat. No. 3317 to 23.2 mm for Cat. No. 3057. An even broader example (Figure 27 q) was recovered, but it may have functioned as a hafted knife rather than as a point. One reconstructed large side-notched biface was recovered from the Oxbow zone. Both of these relatively large specimens will be described in the section pertaining to bifacially flaked knives.

Mount Albion (N=8)

Side to corner-notched, convex-base points quite reminiscent of the Mount Albion points illustrated from the Hungry Whistler site in Colorado's Rocky Mountains (Benedict 1978:Figure 37) and the Boss Hill Norner-Notched from FdPe-4 in central Alberta (Doll 1982:Plate 1) were encountered at EgPr-2. Most of them occurred below the Oxbow zone. Five of the points came from the 35-40 cm level, two were found at 40-45 cm and a reworked example occurred higher up in the 20-25 cm zone (Table 10). All but two of the specimens were retrieved from the Block Excavation.

Two styles of base configuration are evident; a fairly narrow type where the neck width ranges between 7.8 mm and 12.0 mm (Figure 23 q and r; Figure 25 b, c and h), and a somewhat broader variety whose neck width falls between 13.5 and 14.2 mm (Figure 25 e, f and i). In view of the small sample of these points, and the mixed nature of the culture-bearing deposits, it would be somewhat premature at this time to say with any certainty whether one or two distinct components are represented. At the Hungry Whistler site the "hafting width" of the Mount Albion points varied between 11 and 17 mm (Benedict 1978:49). Readings ranging between 9.48 to 14.68 mm are given for the neck width for the corner-notched points from Boss Hill (Doll 1982:Table 1).

Pronounced basal grinding is present on two of the wide and two of the narrow examples. A small grey chert point (Figure 25 h) has been worked into an end scraper; no wear is visible to the unaided eye on the functional end. Other qualitative and quantitative data is contained in Tables Ap-2 and Ap-3 in Appendix I.

Table 10: Mount Albion points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
4624	15N 36W NE 35-40	dull green siltstone	25 e
4628	15N 36W NE 40-45	grey quartzite	25 c
*4822	15N 37W NE 20-25	grey chert	25 h
5491	15N 40W NE 35-40	black pebble chert	25 f
5654	15N 41W SW 35-40	grey chert	25 b
5769	15N 42W SE 40-45	white quartzite	25 i
970	12N 48W NW 35-40	dull green siltstone	23 r
4058	15N 32W NE 35-40	black pebble chert	23 q

*This bifacially flaked specimen was reworked into an end scraper.

Scottsbluff (N=1)

The base of a possible Scottsbluff point (Figures 28 c and 29 c) was discovered in the 40-45 cm level in the southwest quadrant of 15N 40W in the Block Excavation. The point was manufactured from a very fine-grained dull green siltstone. Pressure flake scars cover both obverse and reverse aspects of the point base. On both aspects the final flakes originated from the left lateral edge since the scars conspicuously overrun those which were detached either from the base or the right lateral edge. Final shaping was accomplished by extensive grinding of both the basal and lateral edges. In cross section the base is lenticular. It is 18.2 mm wide and 5.5 mm thick. The point is represented by only a 13.8 mm long fragment.

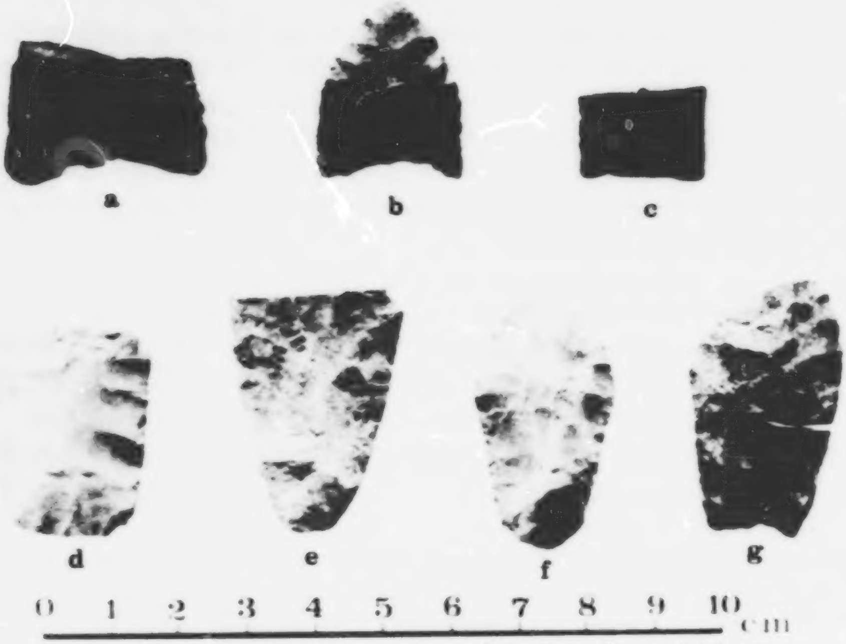

a
b
c
d
e
f
g
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 28: Obverse aspect of two fluted points (a and b), a Scottsbluff point base (c), and four Agate Basin points (d to g) from the Block Excavation.

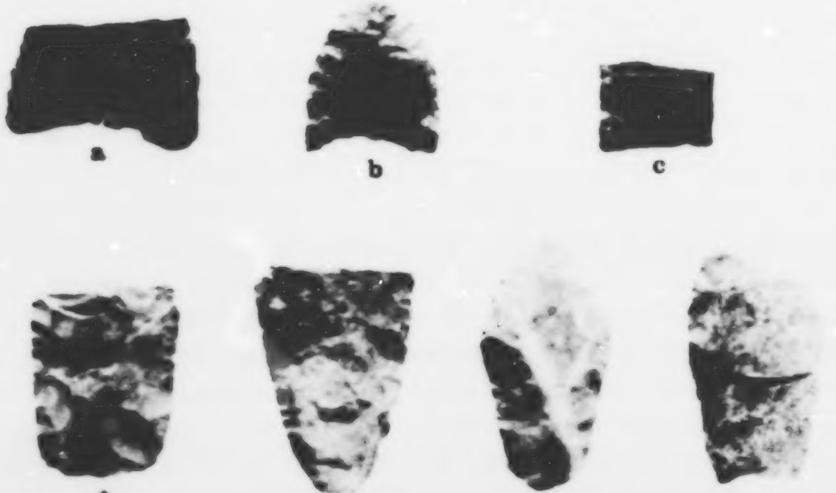

a
b
c
d
e
f
g
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 29: Reverse aspect of the points shown in Figure 28.

Agate Basin (N=4)

One reworked example and three base portions of lanceolate points were recovered from the Block Excavation at EgPr-2. All were manufactured from locally obtainable siltstones. The obverse and reverse aspects of the four specimens are shown in Figures 28 and 29 d to g, respectively. The provenience of the points is given below in Table 11.

Table 11: Agate Basin points from site EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
3427	14N 40W NW 40-45	black banded siltstone	28 g
3570	14N 41W NE 35-40		
3731	14N 42W SW 40-45	fine grey siltstone	28 d
5922	16N 34W SE 30-35	weathered tan siltstone	28 e
7717	17N 34W SE 35-40	dull green siltstone	28 f

The quality of the workmanship reflected by the points is not that exceptional, but this may be a factor of the poor type of lithic material utilized rather than the capability of the knappers. A tendency towards oblique parallel flaking is evident on the obverse aspect of one example (Figure 28 d), but the reverse aspect exhibits an irregular flake pattern, even though this specimen was made from a homogeneous fine-grained siltstone which appears to be quite suitable for flaking. One point (Figure 28 g) was shaped by the removal of flakes in an irregular manner, perpendicular to the length of the blade. The remaining two examples were fashioned from flakes by the irregular removal of pressure flakes. All four points exhibit heavy lateral edge smoothing.

Because of their generally rounded base and expanding blade, the points are tentatively suggested to belong to the Agate Basin Complex. The hint of shouldering on the reworked point (Figure 28 f) may be the result of an attempt to prepare a base from a thin portion of a flake. In other words, the shouldering appears to be a consequence of practical, rather than stylistic decisions.

Midland (N=1)

The base of a thin, parallel-sided Paleo-Indian point was recovered from the Block Excavation at EgPr-2. It came from the 40-45 cm level in the southwest quadrant of 16N 38W and was found within an extensive lithic workshop area. The point (Figure 30 a) is made from a mottled creamy-white chert which is quite similar to the Swan Valley chert that the senior author has encountered in considerable quantities throughout western Manitoba and in lesser amounts in the southeastern corner of Alberta.

In cross section the point is flat to slightly lenticular. It was shaped by the removal of irregular pressure flakes from both surfaces. The most striking characteristic of this specimen is the minute retouching evident on both sides of the heavily ground lateral edges (Figure 30 a). Many of these flake scars are less than a millimeter in length. Fourteen individual tiny flake scars counted within one centimeter along one lateral edge aptly illustrates the intricacy of the retouching. What was thought at first glance to be intentional point resharpening along one of the lateral edges is, upon closer examination, now believed to be damage imposed during or after the specimen broke.

The base is 22.6 mm wide and 4.8 mm thick. The basal concavity is uniformly rounded, not squared, and has a depth of 5.5 mm. As a consequence, the ears appear quite extended and somewhat pointed; a trait common to some of the points from the Lindenmeier site (Wilmsen and Roberts 1978:Figure 109). However, the Midland point from EgPr-2 differs from the Lindenmeier Folsom fluted examples in that it displays no squaring of the concavity. The Midland point from the Sibbald Creek site displays traces of basal thinning, but not to the degree that one would call this fluting.

Fluted Point Tradition (N=2, plus channel flake fragment)

One complete fluted point and the base portion of another example, plus a fragment of a channel flake, were discovered within the Block Excavation at EgPr-2. They represent the first instance of the recovery of artifacts of the Fluted Point Tradition in stratigraphic context from an archaeological site in western Canada. The find is significant, therefore the three items will be described individually in some detail.

The complete specimen (Figure 28 b) was recovered within an extensive lithic workshop in the 40-45 cm layer in the northwest quadrant of unit 16N 39W. It was manufactured from a dull green crystalline siltstone. Careful examination shows that the tip of the point had been reworked, possibly to rejuvenate a broken specimen. Pressure flake scars cover the entire surface of both the obverse and reverse aspects of the point. The right lateral edges seen from both the obverse and reverse aspects are steeply retouched, giving the point an alternate beveled appearance.

Both faces of the complete specimen are fluted. On the obverse aspect (Figure 28 b) the fluting was achieved through the detachment of a single pressure flake up from the center of the base. The flake scar is 9.3 mm long and 7.5 mm wide and largely obliterates at least one earlier flake scar, for a negative bulb is still partially visible to the right of center. The reverse aspect (Figure 29 b) also shows multiple fluting; this, too, was accomplished by pressure flaking. Two flakes measuring no less than 16 mm in length were removed, one from each side of the center. The scar from the most recent flake is 9.0 mm wide and covers much of the left half of the reverse aspect. Because the point tip has been resharpened it is now impossible to tell how the channel flakes had terminated. The base was not trimmed after the channel flakes had been removed. Neither the base, nor the lateral edges, show evidence of grinding.

The second fluted point, Cat. No. 8385, is represented by two conjoining base sections (Figure 28 a). The two fragments were recovered from the 40-45 cm level of the northeast quadrant of 17N 38W just beyond the lithic chipping station where the first fluted point was discovered. The point is made from a dense, fine-grained black siltstone or pebble chert and appears to be from an original, rather than a reworked, triangular-shaped specimen; it may have been in the order of five centimeters long. The broad, V-shaped base is very similar to the style of the Clovis points reported from Saskatchewan (Kehoe 1966:Figure 2).

One side of the point displays prominent fluting (Figure 28 a). A relatively large flake was detached from the center of the base. The maximum width of the consequent scar is 13.0 mm, but its length could not be determined for it is truncated by the broken end. The relatively flat negative bulb and the absence of crushing at the point of impact suggest that the central channel flake was removed by direct pressure. A much smaller flake was subsequently removed to the left of the central flake. Post-fluting lateral edge trimming was carried out, and this is indicated by the fact that the scar of a flake that originated along the left side overruns the central channel flake scar.

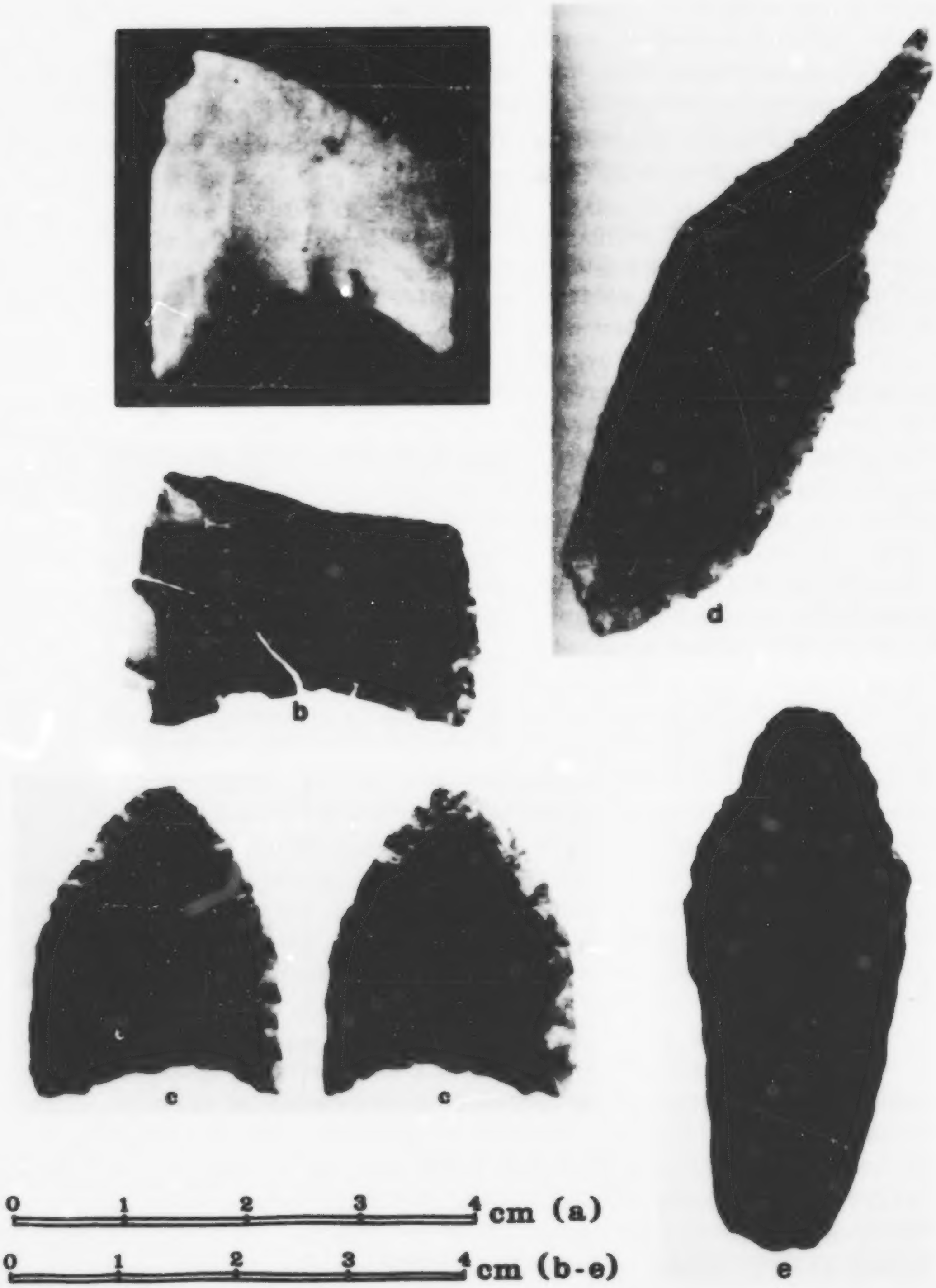

d
b
c
c
0 1 2 3 4 cm (a)
0 1 2 3 4 cm (b-e)
e

Figure 30: Close-ups of the Midland (a) and two fluted points (b and c), a possible perforator (d) and a retouched decortication flake (e), all from the lower levels of the Block Excavation. Their Cat. Nos. are 6886, 8385, 7229, 6766, and 3577.

The opposite face is largely covered by scars of flakes which had been removed from the lateral edges. Therefore, it is difficult to say if this side, too, had originally been fluted. The point is fairly thin, being only four millimeters thick. It is essentially flat in cross section. The base and one lateral edge are heavily ground while the other lateral edge exhibits very slight smoothing.

A channel flake fragment (Figure 41 q) of a dull green siltstone was found in the northwest quadrant of 16N 35W at a depth of 30-35 cm. It is split longitudinally and is missing the striking platform, the extreme distal end, and part of one lateral edge. In terms of metric dimensions, the fragment has a length of 22.3 mm, a width of 9.3 mm, and a thickness of 2.3 mm. The channel flake is too fragmentary to reflect the general flaking pattern of the point it was struck from, although it appears that some of the flakes had been removed in a direction perpendicular to the long axis of the specimen.

Unidentifiable Point Fragments (N=44)

Forty-four point fragments were recovered from the excavations but could not be identified in terms of their cultural affiliation. Of these there are seven that snapped just at the notches (Figures 21 p; 22 f; and 25 j) and another six that appear to be point blanks or rejects (Figure 21 u). The rest of the fragments comprise point tips or mid sections. Qualitative and metric data on these fragments is presented in Tables Ap-2 and Ap-3 in Appendix I.

Three of the fragments, in particular, warrant describing as they may well be sections of Paleo-Indian points. The first example (Figure 25 a) is a mid section of a mottled brown chert point. The point bears parallel horizontal flake scars and has a flat lenticular cross section. It is 4.6 mm thick. It appears to have been used as a wedge as all sides except for one lateral edge display signs of battering. Another specimen (Figure 25 d) is made up of two refitted tip pieces. It is made of a black banded siltstone and displays broad collateral flake scars on one aspect. The final fragment (Figure 25 g) is a tip of a broad point made of a creamy tan chert. It is lenticular in cross section and has a thickness of 5.0 mm. Small pressure flakes were removed in an irregular manner from both surfaces of this example. This point fragment came from the 40-45 cm level, while the two above examples were found in the 45-50 cm zone of the Block Excavation.

BIFACE KNIVES (N=104)

Bifacially flaked knives occurred throughout the cultural deposits at the Sibbald Creek site. Seventy six complete and broken examples were recovered from the Block Excavation and an additional 28 came from outside this area. The bifaces from the Block Excavation were laid out according to vertical provenience in order to ascertain if a particular style was vertically (temporally) restricted, or if it occurred with equal frequency at other levels. Seven formal varieties of bifaces were recognized; bipointed, oval, tear drop, triangular, rectangular, parallel-sided, and hafted. A large proportion of bifaces comprised fragments which defied any formal identification. The occurrence of bifaces for each level was tabulated, as was the frequency of lithic material used (Table 12).

Table 12: Distribution of bifaces from the Block Excavation

Depth	Biface Types								Material					
	Bipointed	Oval	Tear Drop	Triangular	Rectangular	Parallel Sided	Hafted	Unidentified	Quartzite	Cryst. Siltstone	Bl. Band. Siltst.	Other Siltstones	Chert/Chalcedony	Petrified Wood
0-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5-10	1	-	3	2	-	-	-	6	-	2	2	2	5	1
10-15	1	2	1	-	-	-	-	8	3	6	2	1	-	-
15-20	-	1	2	1	1	1	-	6	4	5	3	-	-	-
20-25	-	4	1	-	1	-	1	4	2	5	3	-	-	1
25-30	-	1	1	-	-	-	-	4	2	2	2	-	-	-
30-35	-	2	2	-	-	-	1	4	3	2	4	-	-	-
35-40	-	2	-	1	-	-	-	3	-	5	1	-	-	-
40-45	-	4	-	-	-	-	-	2	2	3	-	-	1	-
45-50	-	-	-	-	-	-	-	2	-	1	-	-	1	-
Totals	2	16	10	4	2	1	2	39	16	31	17	3	7	2

Representative or diagnostic bifaces from various levels of the Block Excavation are shown in Figures 31 to 37. Their horizontal and vertical provenience, together with metric and other qualitative data, are summarized in Table Ap-4, Appendix I. Oval was the most numerous form of biface recovered from the Block Excavation (Table 12 and Figures 31 e; 33 e; 34 a and c; 36 a, b and c; and 37 a). The next most common form was tear drop-shaped, of which 10 examples were found (Figures 31 f and 35 b). Four triangular (Figures 31 d and h; 33 c), two rectangular (Figure 32 d), and one parallel-sided biface (Figure 33 g) also came from the Block Excavation (Table 12), as did two hafted bifaces (Figures 27 q and 35 a).

There were 39 fragments whose form could not be clearly determined (Figures 31 a, b and c; 32 b and c; 33 a and b).

The quality of workmanship reflected by the bifaces is average. Many of the larger bifaces appear to have been prepared solely by percussion flaking while pressure flaking was used to trim some of the smaller examples. Breakage was common and in a few cases pieces that fit together have been recovered (Figure 31 d and h; 35 a; and 36 a). The overwhelming use of quartzites and siltstones may explain the high incidence of breakage.

Two hafted bifaces (Figures 27 q and 35 a) were recovered from the Oxbow zone in the Block Excavation. Both were prepared from black banded siltstone by percussion flaking. The complete specimen (Figure 35 a) was reconstructed from three pieces. It has a length of 71.4 mm, a width of 44.5 mm, and a thickness of 7.2 mm. Both lateral edges were trimmed through the random removal of pressure flakes. The implement does not display any evidence of use wear, nor are there any traces of intentional smoothing of the lateral or basal edges. The broken example has a hafting width of 29.5 mm, as compared with 25.2 mm for the complete biface, and thus, may be part of an even larger hafted knife. These hafted implements were undoubtedly standard items in the tool kits of the Oxbow hunters. They are associated with Oxbow components reported from the Northern Plains, for example, at the Harder site near Saskatoon (Dyck 1977:Plate 17); at the Long Creek site near Estevan (Wettlaufer 1960:Plate 16); and possibly in the Swan Valley, Manitoba (Gryba 1976a:Figure 10; 1977:Figure 4).

Twenty-eight bifaces were recovered in tests outside the Block Excavation. Only nine are complete. The more diagnostic examples are illustrated in Figures 38 and 39. Thirteen of the bifaces were made of crystalline siltstone (Figure 39 c, e and f), eight were of

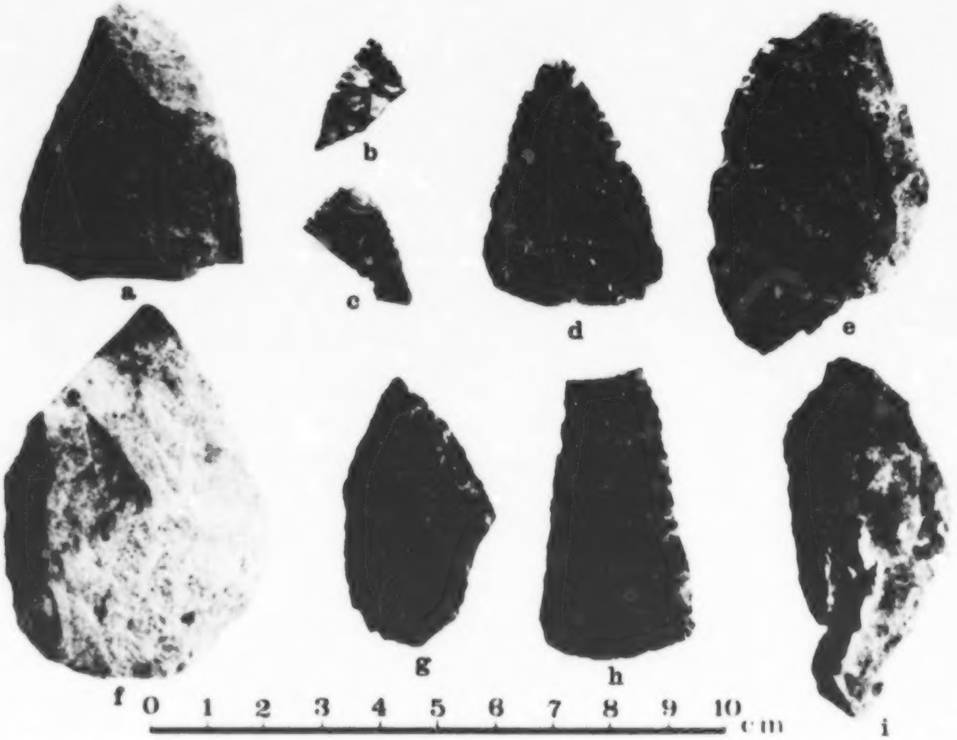

a
b
c
d
e
f
g
h
i
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 31: Bifaces from the 5-15 cm zone of the Block Excavation; (a) 7339, (b) 2601, (c) 2519, (d) 2518 & 2600, (e) 7447, (f) 3332, (g) 4097, (h) 5707, and (i) 8271.

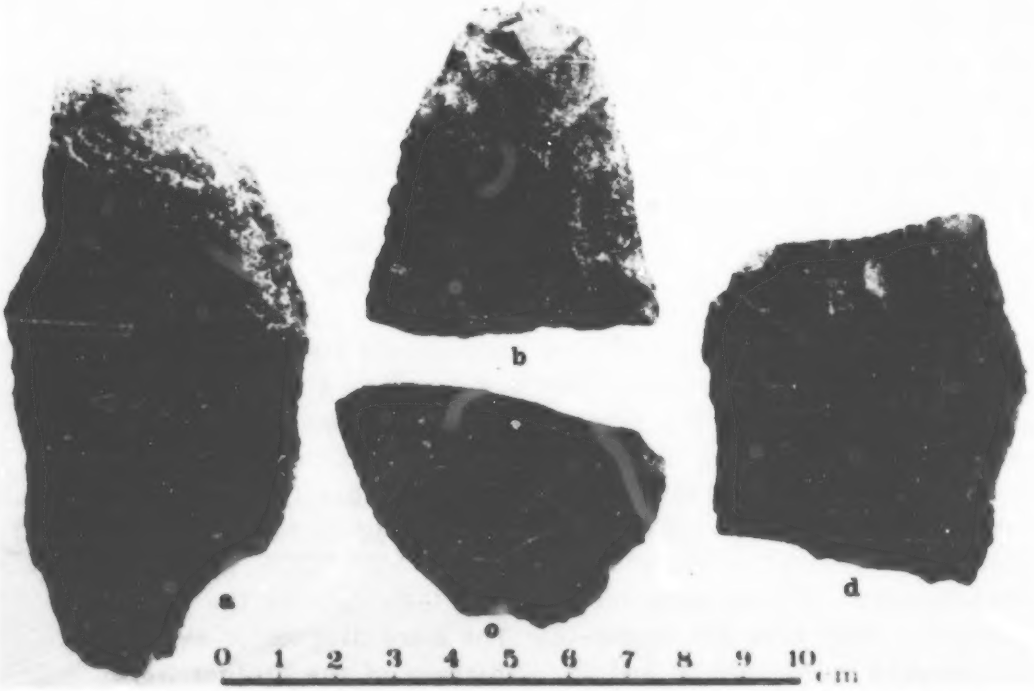

a
b
c
d
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 32: Bifaces recovered from the 10-15 cm zone of the Block Excavation. Included are specimens Cat. Nos. 2753 (a), 5964 (b), 5845 (c), and 3012 (d).

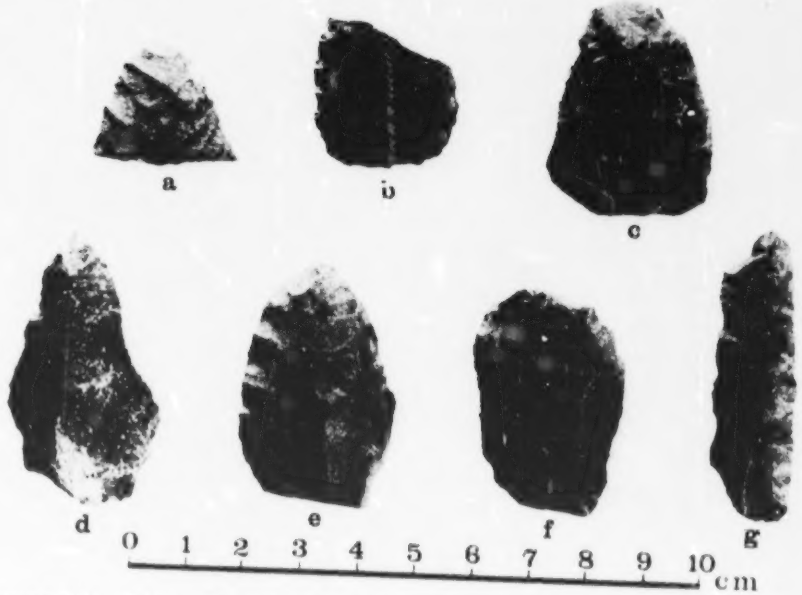

a
b
c
d
e
f
g
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 33: Bifaces and biface fragments (a to c and e to g) and a perforator (d) from the 15-20 cm layer of the Block Excavation. In alphabetical order the specimens include Cat. Nos. 3219, 4543, 1750, 6585, 1656, 2320 and 8276.

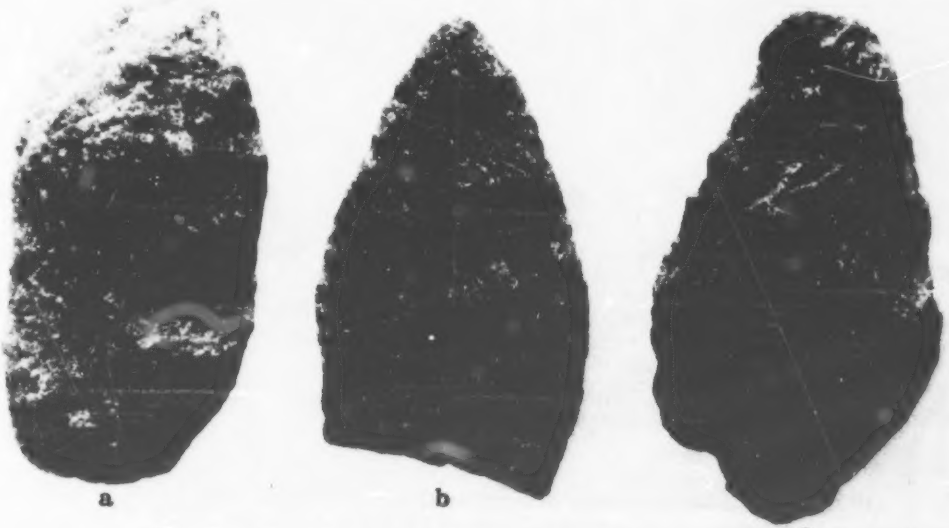

a
b
c
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 34: Large quartzite bifaces from the 20-30 cm zone of the Block Excavation. Included are Cat. Nos. 5856 (a), 6072 (b) and 7000 (c). The last specimen shows considerable wear.

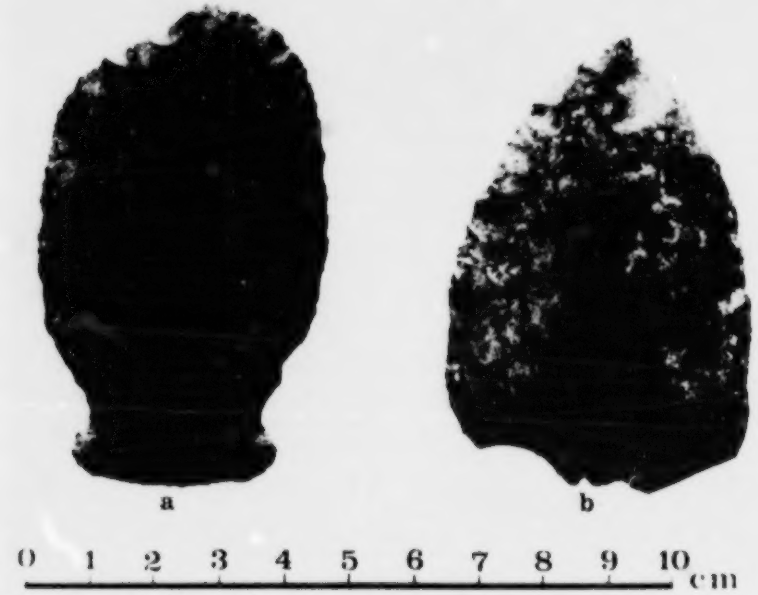


Figure 35: Hafted biface reconstructed from three pieces (Cat. Nos. 4927, 3195 and 3142) and a tear drop-shaped chert biface (Cat. No. 4880) from the 20-25 cm level of the Block Excavation.

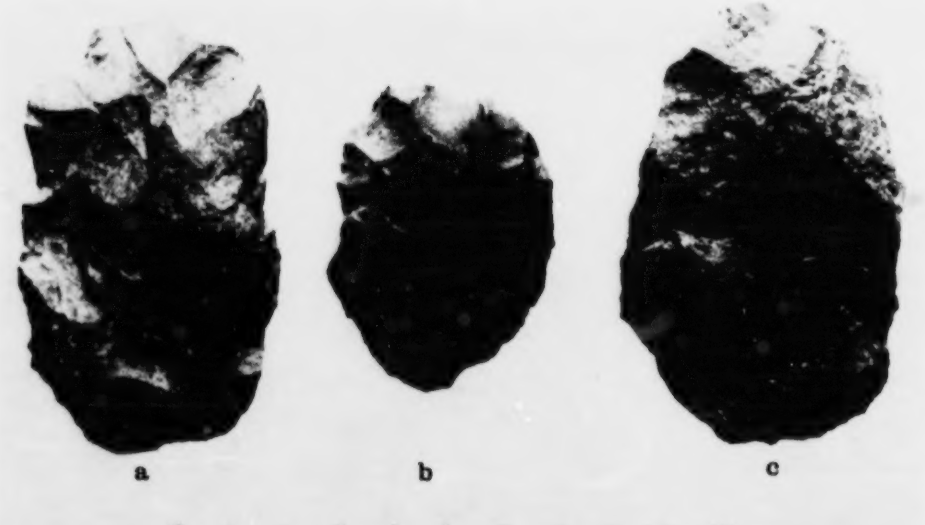


Figure 36: Three oval crystalline siltstone bifaces from the lower layers of the Block Excavation. The first one (Cat. No. 3680) came from the 40-45 cm layer; the other two (Cat. Nos. 5210 and 5011) are from the 35-40 cm layer.

7
6
5
4
3
2
1
0 cm

Figure 37: Crude quartzite biface (Cat. No. 7960) recovered from the 40-45 cm layer of the Block Excavation.

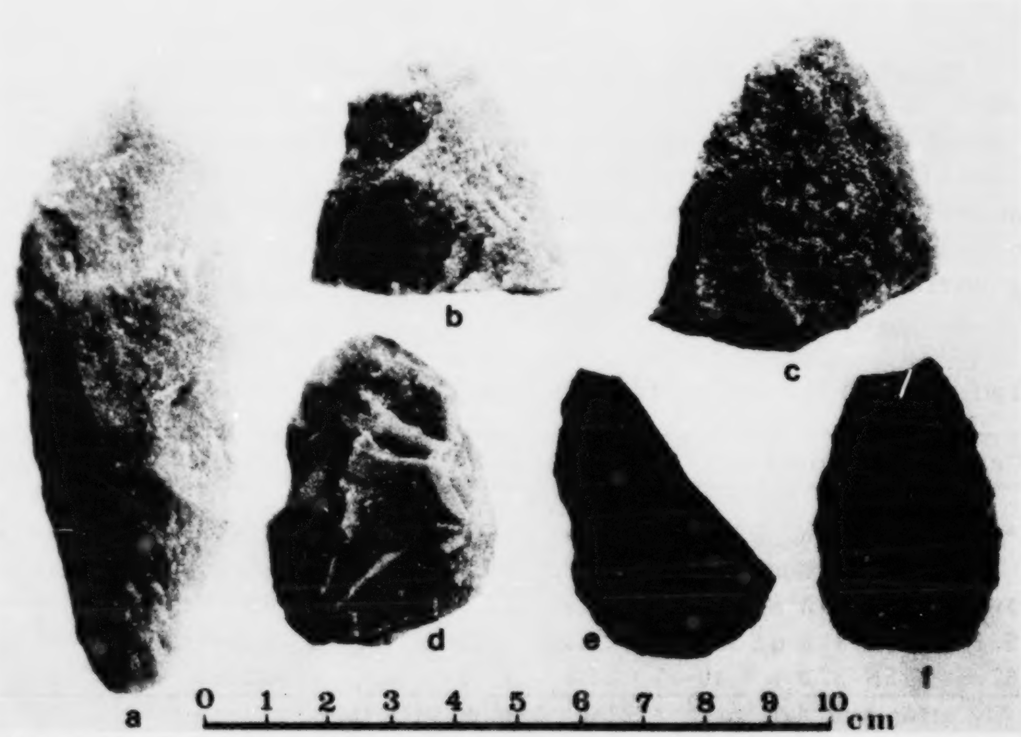

a
b
c
d
e
f
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 38: Quartzite bifaces and fragments recovered from outside the Block Excavation. Included are (a to f, respectively) Cat. Nos. 4060, 1035, 362, 705, 695, and 730.

quartzite (Figure 38 a to f), four were made of black banded siltstone (Figure 39 d and g), and two small oval bifaces were fashioned from a fine grey siltstone (Figure 39 b). The diagnostic bifaces comprised a bipointed example, one rectangular specimen, four oval and three tear drop-shaped examples.

Because of the dispersed nature of the test units outside the Block Excavation, and the generally collapsed stratigraphy, the bifaces are not amenable to the same type of analysis as that which was undertaken with those which were recovered from the contiguous area of the Block Excavation. However, one biface, in particular, stands out and warrants describing. This is a relatively large bipointed or lanceolate example (Figure 38 a) that was discovered in the northeast quadrant of 15N 32W at a depth of 40-45 cm. It was chipped from a grey quartzite by percussion flaking. One lateral edge was bifacially trimmed through pressure flaking. It is 101.3 mm long, 37.8 mm wide, and 12.0 mm thick. The smoothing seen on one lateral edge near the narrow end may be a result of extensive use rather than deliberate grinding.

DRILLS AND PERFORATORS (N=5)

Of all the more common stone tools that one would expect to find at major habitation sites, drills and perforators at EgPr-2 were among the poorest represented. Only five examples were discovered. Perhaps awls of bone or wood were used in lieu of the stone tools and these have since perished, or maybe some of the functions of drilling or piercing were performed by other stone tools such as, for example, gravers.

Table 13: Drills and perforators from site EgPr-2

Cat.	Provenience	L.	W.	Th.	Material	Fig.
*322	12N 48W SE 25-30	18.0*	7.0	5.1	grey chert	40 o
422	12N 24W SW 15-20	32.0	10.3	4.0	obsidian	40 p
1097	13N 24W SE 10-15	24.5	14.2	4.9	bl. b. siltst.**	40 n
6585	16N 37W SE 15-20	47.3	27.2	7.5	sp. quartzite	33 d
6766	16N 37W NW 40-45	55.5	17.5	8.7	siltstone	30 d

*drill fragment **black banded siltstone

Some of the basic qualitative and quantitative data on the drills are listed in Table 13. The right hand column shows the figure in

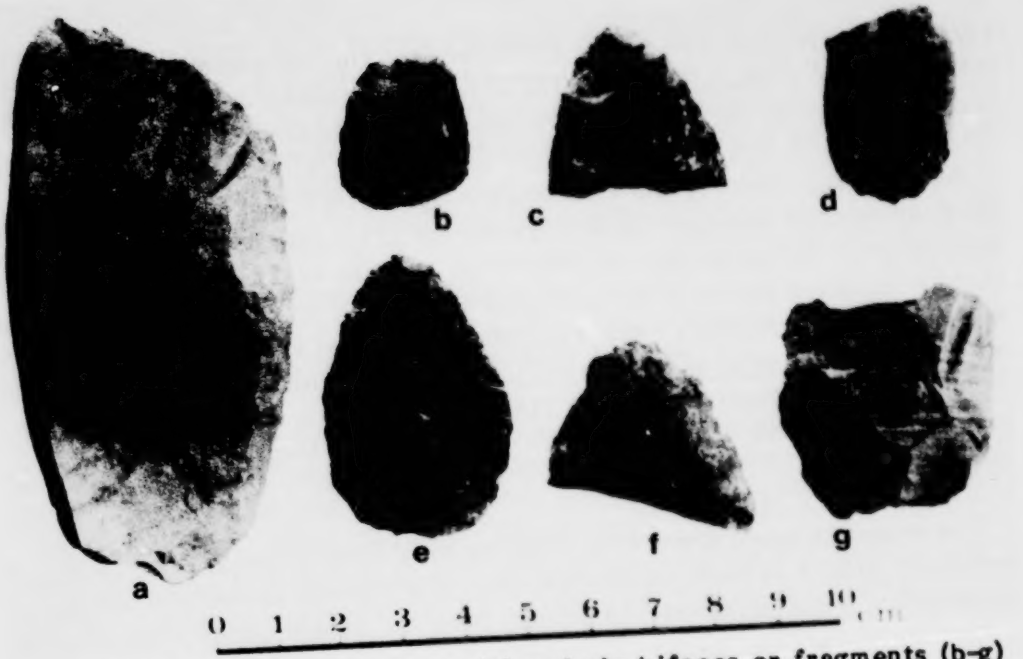

a
b
c
d
e
f
g
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 39: Large retouched flake (a) and six bifaces or fragments (b-g) from outside the Block Excavation. Their Cat. Nos. are 906 (a), 526 (b), 361 (c), 1353 (d), 491 (e), 1363 (f), and 515 (g).

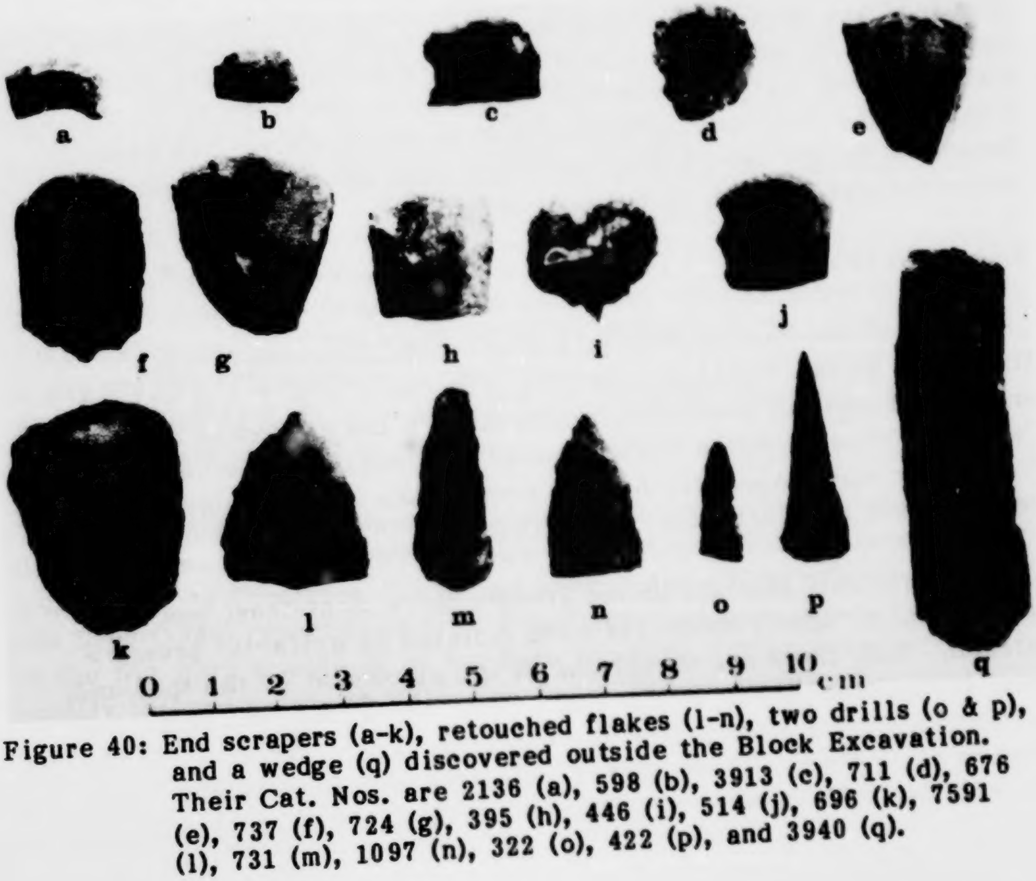

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 40: End scrapers (a-k), retouched flakes (l-n), two drills (o & p), and a wedge (q) discovered outside the Block Excavation. Their Cat. Nos. are 2136 (a), 598 (b), 3913 (c), 711 (d), 676 (e), 737 (f), 724 (g), 395 (h), 446 (i), 514 (j), 696 (k), 7591 (l), 731 (m), 1097 (n), 322 (o), 422 (p), and 3940 (q).

which the individual items are illustrated. One specimen (Cat. No. 322) comprises a short portion of a bifacially flaked drill tip which is almost as thick as it is wide. No use wear is evident on the tip.

Another specimen (Figure 40 p) is a delicately flaked drill of a dark grey opaque obsidian whose tip tapers gradually to a sharp point. The fact that the drill was recovered at a depth of 15-20 cm in unit 12N 24W is not a reliable indicator of great age or cultural affiliation, for Besant points found in the vicinity at an even greater depth suggest that considerable mixing of the cultural deposits had occurred locally. In the Block Excavation obsidian flakes were found in association with Plains Side-Notched points and also at the same level as the Mount Albion points.

The example made from the speckled grey quartzite (Figure 33 d) shows only slight retouching of the tip. Some wear is evident on the extreme tip. The discovery of an ear from an Oxbow point made of this distinctive quartzite in the same level is a good indicator of the probable cultural affiliation of the drill.

The final example (Figure 30 d) is a questionable perforator. It came from the base of the deposits in the Block Excavation. This possible tool is made of a highly weathered siltstone. The weathering is so advanced that it is now impossible to detect flake scars and, were it not for the fact that definite flakes of this material had been discovered in the same level, one might even question whether the perforator was, indeed, of cultural origin.

GRAVERS (N=15)

Fourteen convincing gravers and one possible example were discovered at the Sibbald Creek site (Figures 41 e-p, r & s; 42). A summary of some of the basic information on the gravers is presented below in Table 14 while more detailed information could be obtained from Table Ap-5, Appendix I. The gravers are listed according to their stratigraphic and horizontal provenience.

The one trait that all of the gravers share is at least one projection, or "spur", which has been isolated by unifacial pressure retouch. But, there are variations in the placement of the spur and, thus, in the final shape of the tool. With two exceptions (Figure 41 o and r) the spurs are worked on the dorsal surface. Three of the gravers (Figure 41 f, g and o) have double spurs, the rest have single projections. The dorsal ridge, where possible, was steeply retouched to form a sharp tip. Even the two flakes, where the spur is placed along the distal end of the left lateral edge (Figure 42 a and b), were so fashioned in order to take advantage of the dorsal ridge. It seems that the final form of the tool was determined not so much by stylistic as by practical considerations.

Table 14: Gravers from site EgPr-2

Cat. N.	Provenience	Lithic Material	Figure
1251	13N 27W NE 20-25	dull green pebble chert	41 k
5757	15N 42W SE 20-25	dark brown chalcedony	41 g
6125	16N 34W NW 20-25	dull green pebble chert	-
810	12N 41W SW 25-30	burnt white chert	41 s
7463	16N 41W SW 25-30	dull green siltstone	41 h
1919	13N 41W SE 30-35	banded grey siltstone	41 i
5483	15N 40W NE 30-35	dull green pebble chert	41 n
7319	16N 40W SW 30-35	dull green pebble chert	41 m
3320	14N 40W SW 35-40	black banded siltstone	41 r
5489	15N 40W NE 35-40	dull green pebble chert	41 p
4576	15N 36W SW 35-40	dull green siltstone	41 o
8128	17N 36W NE 35-40	crystalline siltstone	41 l
3525	14N 41W SW 40-45	pink-grey chert	41 j
4967	15N 38W SE 40-45	black quartzite	41 e
7530	16N 41W NW 40-45	black quartzite	41 f

The amount of retouching of the edge away from the vicinity of the spur varies from none (Figure 41 h) to almost the entire perimeter (Figure 41 m and n). Some use polish is evident on the spurs of three of the gravers (Figure 41 h, i and l) and on the lateral edges of five others (Figure 41 e, m, n, o and p); the remaining examples do not display visible signs of use wear.

Gravers are very conspicuous elements in Paleo-Indian assemblages. On the Plains they comprise a primary tool type for complexes ranging from Clovis to Frederick (Irwin and Wormington 1973:Table 1). Frison and Grey (1980) report them from Pryor Stemmed components excavated in the Big Horn Mountains of northern Wyoming. They occur with basally thinned points at Holcombe Beach, Michigan (Fitting, Devisscher and Wahla 1966), with fluted and lanceolate points at the unstratified Banting and Hussey sites in southern Ontario (Storck 1979), with fluted points at Debert, Nova Scotia (MacDonald 1968), and at many other sites

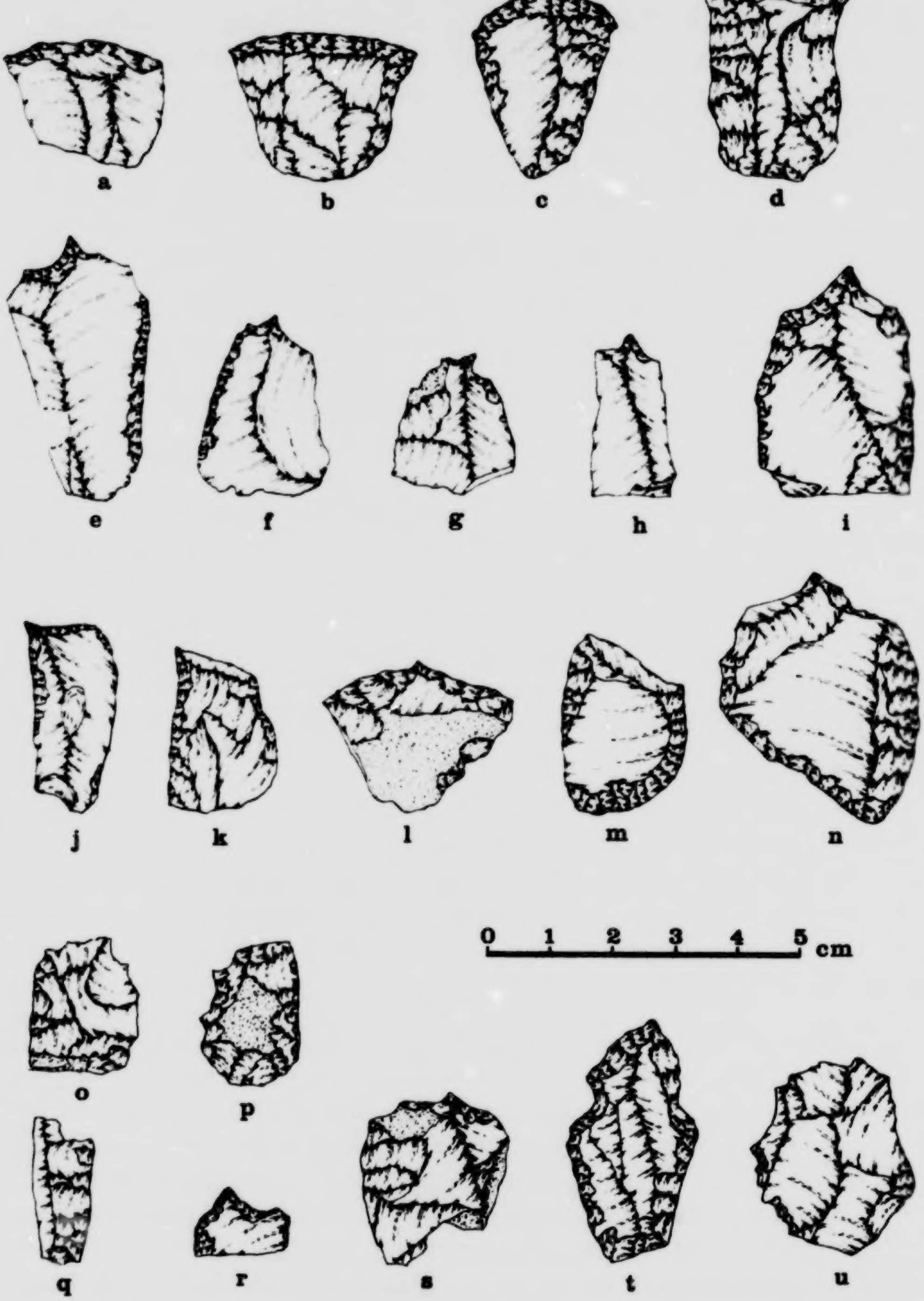

a
b
c
d
e
f
g
h
i
j
k
l
m
n
0 1 2 3 4 5 cm
o
p
q
r
s
t
u

Figure 41: Some of the possible Paleo-Indian artifacts recovered from EgPr-2. Included are spurred end scrapers (a-d), gravers (e-p, r and s), a channel flake fragment (q), a denticulate tool (t), and a notched flake (u).

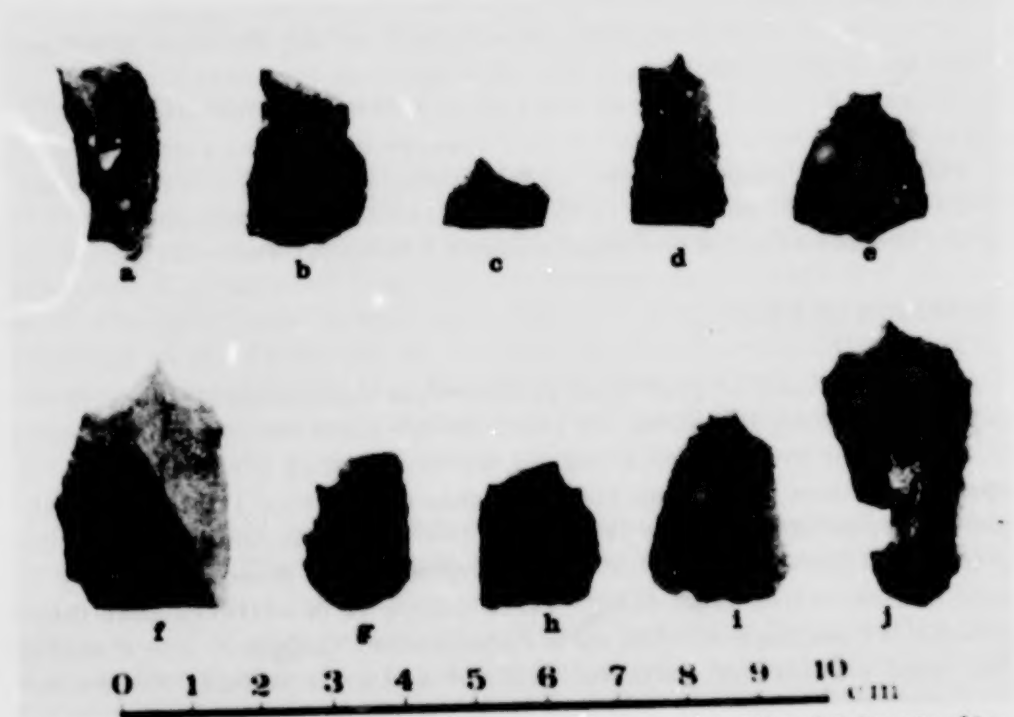


Figure 42: Some of the gravers recovered from the Sibbald Creek site. They include, in alphabetical order, Cat. Nos. 3525, 1251, 3320, 7463, 5757, 1919, 5489, 4576, 7530 and 4967. Specific details on these, and on the other gravers shown in Figure 41, are presented in Appendix 2.

throughout North and Central America, as far south as Guatemala (Gruhn and Bryan 1977:Figure 16).

At EgPr-2 the gravers are restricted to the lower half of the cultural deposits (Table 14), an indication that they are of some antiquity here as well. Elsewhere in Alberta, gravers have been reported from surface context in the Little Gem area north of Medicine Hat in mixed association with Scottsbluff, round-based lanceolate and concave-based, basally-thinned points (Wormington and Forbis 1965:56-97). They occur with Cody complex artifacts at the Fletcher site near Lethbridge (Forbis 1968:Figure 2). G. Fedirchuk (personal communication, 1981) informed the senior author that she recovered several gravers from unstratified and undated context at site FaPn-38 in the Dickson Dam reservoir west of Red Deer. She also mentioned that gravers were quite numerous in the unstratified multicomponent Fisherman Lake sites in the southwestern Northwest Territories.

NOTCHED FLAKE (N=1)

A notched flake of patinated yellow-wine chalcedony (Figure 41 u) was retrieved from the 35-40 cm level in the southeast quadrant of unit 16N 37W of the Block Excavation. A local workshop containing prepared platform percussion flakes of this distinctive lithic material began to appear at the same level, just two meters to the south of where the tool was found. Since the greatest quantity of these chalcedony flakes was recovered from the 40-45 cm level, it is believed that they represent the wastage created by a Paleo-Indian knapper. The discovery of an eared end scraper (Cat. No. 5835) of a similar mottled chalcedony in the western part of the Block Excavation lends support to the possibility that the notched flake is of Paleo-Indian age.

The notched tool was made from an unprepared platform percussion flake. Seven small notches were crudely retouched on the distal and lateral edges of the flake, a task which might have been carried out even by pressing the edges with a finger nail. The artifact is 27.2 mm long, 28.0 mm wide, and 4.7 mm thick. No smoothing is present along any part of the edge to suggest that it had received much use. The fact that it was abandoned near the workshop area suggests that it may have been used once or twice, perhaps to dress sinew, and then discarded.

NOTCHED RETOUCHED TOOL (N=1)

Another unique tool recovered at the Sibbald Creek site is a steeply retouched flake which has been bilaterally notched near the distal end

(Figure 41 t). This implement (Cat. No. 5010) was found in the Block Excavation at 35-40 cm in the southwest quadrant of unit 15N 38W. It is made of a fine tan siltstone. The dorsal surface has been steeply retouched along all sides, including the base. In addition, the ventral surface was retouched on the distal end to produce a tip. Smoothing is present within both notches, thus suggesting that the tool may have been used either as a spokeshave in wood working or for dressing leather or fiber strands. The implement has a length of 37.2 mm, a width of 20.3 mm, and a thickness of 8.1 mm.

RETOUCHED FLAKES (N=302)

Flakes with simple edge retouching comprised the most common artifact category at the Sibbald Creek site. They occurred both within and outside the Block Excavation, and in all levels. The retouched flakes are distinguished from the end scrapers by the fact that the latter are essentially triangular in form and are frequently steeply retouched on the distal end of the flake blank, although lateral edge preparation may occasionally be present. The designation "side scraper" will be reserved for the more massive flakes and pieces that exhibit unifacially executed, steep marginal retouch.

There were 231 retouched flakes from the Block Excavation that were analyzed. The metric and qualitative data are presented in Table Ap-6 in Appendix I. Utilizing the placement, rather than the configuration of edge retouch as a primary criterion for classification, seven different classes of retouched flakes were recognized (Figure 43). The catalogue number of the artifact used to represent each different class is given next to each tool. Type 1 displays dorsal retouching along the right lateral edge, Type 2 has dorsal retouching along the left lateral edge, and Type 3 shows bilateral edge trimming. The primary attribute of Type 4 retouched flakes is the presence of dorsal retouching on the distal end. Type 5 exhibits retouching along one or more edges on the ventral surface, while Type 6 shows unifacial trimming of both dorsal and ventral edges. One class comprises split pebbles worked on the cortex, or dorsal, surface. An eighth class contains tool fragments too small to be confidently assigned to any of the seven classes (Table 15). Undoubtedly, quite a few of these tools were used for many tasks.

Examples of retouched flakes recovered from various levels in the Block Excavation are shown in Figures 44 to 55. The data presented in Table 15 shows that 75 examples (32.47%) of worked flakes which were retouched along the right lateral edge on the dorsal surface comprised

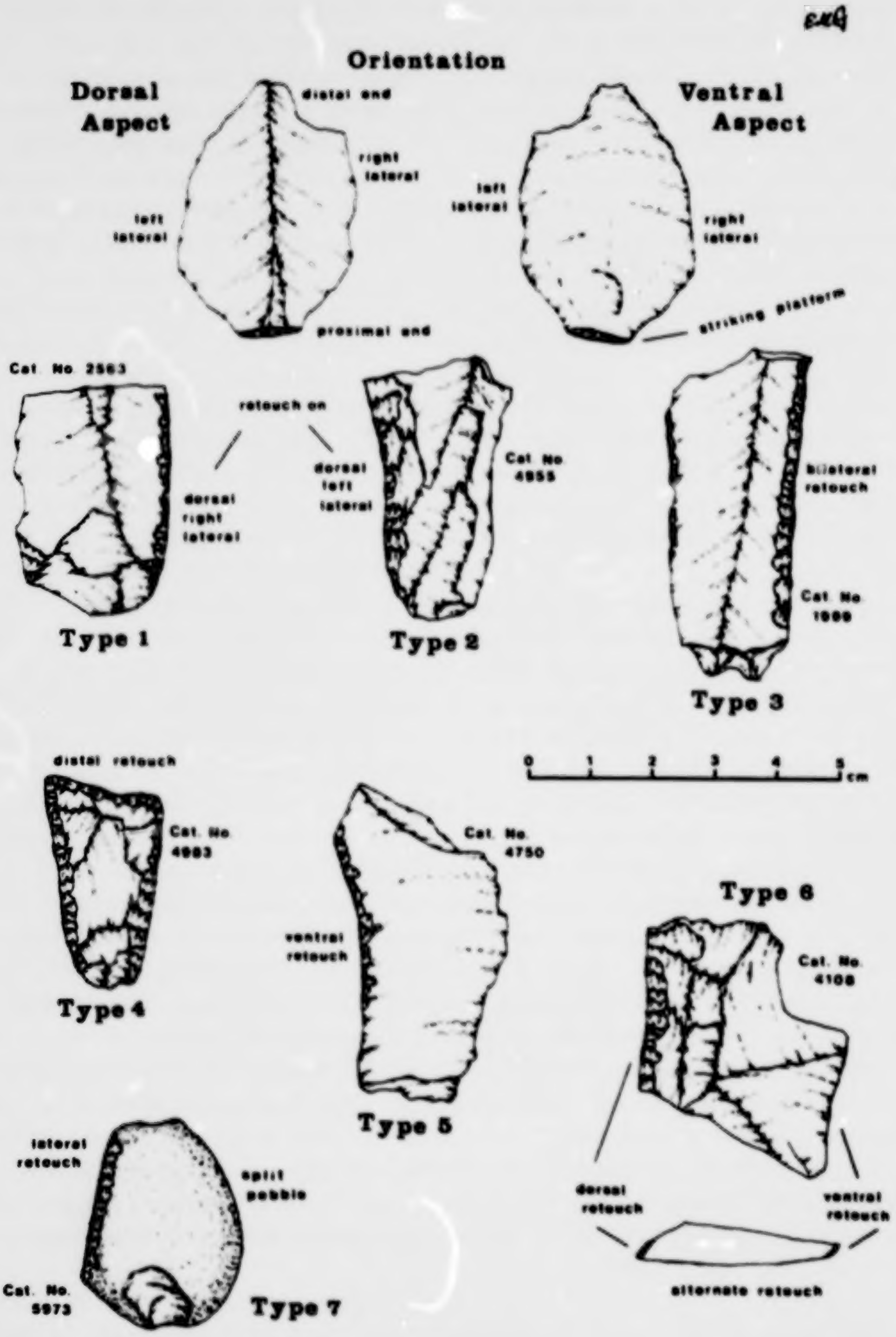

ExG
Orientation
Dorsal Aspect
distal end
right lateral
left lateral
proximal end
Ventral Aspect
left lateral
right lateral
striking platform
Cat. No 2563
retouch on
dorsal right lateral
dorsal left lateral
Cat No 4955
bilateral retouch
Cat No 1999
Type 1
Type 2
Type 3
distal retouch
0 1 2 3 4 5 cm
Cat. No. 4983
Cat. No. 4750
Type 6
ventral retouch
Cat. No. 4108
Type 4
Type 5
lateral retouch
split pebble
dorsal retouch
ventral retouch
Cat. No. 5973
Type 7
alternate retouch

Figure 43: Classification of retouched flakes from site EgPr-2.

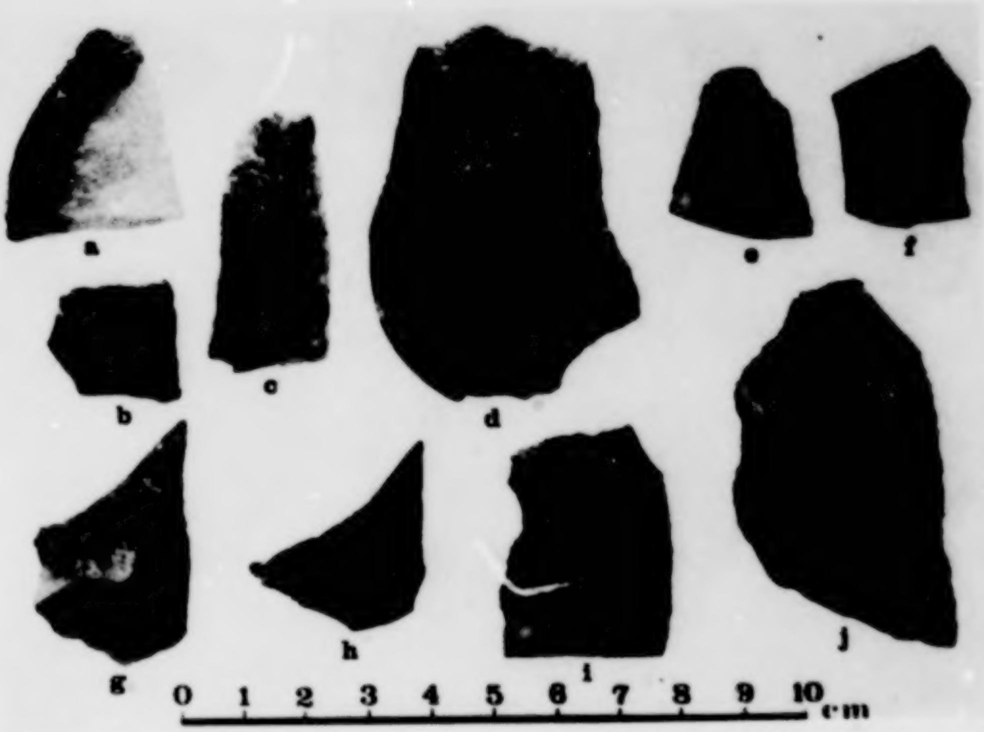

a
b
c
d
e
f
g
h
i
j
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 44: Retouched flakes from the 5-10 cm layer of the Block Excavation. Their Cat. Nos. are 4158 (a), 1934 (b), 3168 (c), 5947 (d), 3169 (e), 2950 (f), 6628 (g), 4463 (h), 1568 (i), and 3795 (j).

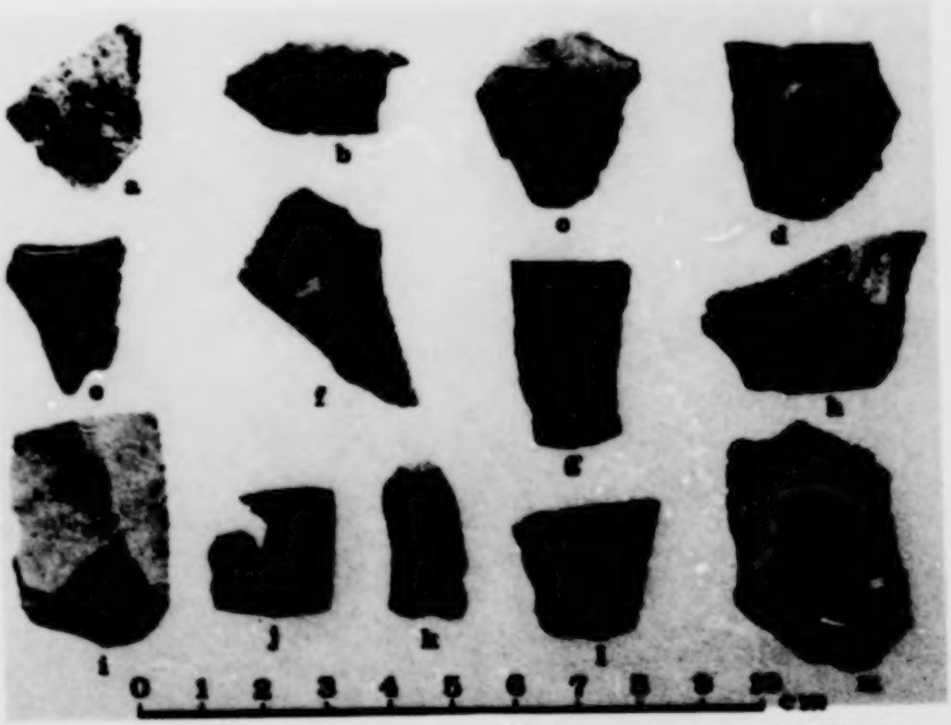

a
b
c
d
e
f
g
h
i
j
k
l
m
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 45: Retouched flakes from the 10-15 cm layer of the Block Excavation. Their Cat. Nos. are 1607 (a), 4515 (b), 3002 (c), 1416 (d), 8200 (e), 7031 (f), 7153 (g), 6308 (h), 2563 (i), (4797, 4808, 4850 & 4689) (j), 2799 (k), 1241 (l), and 2478 (m).

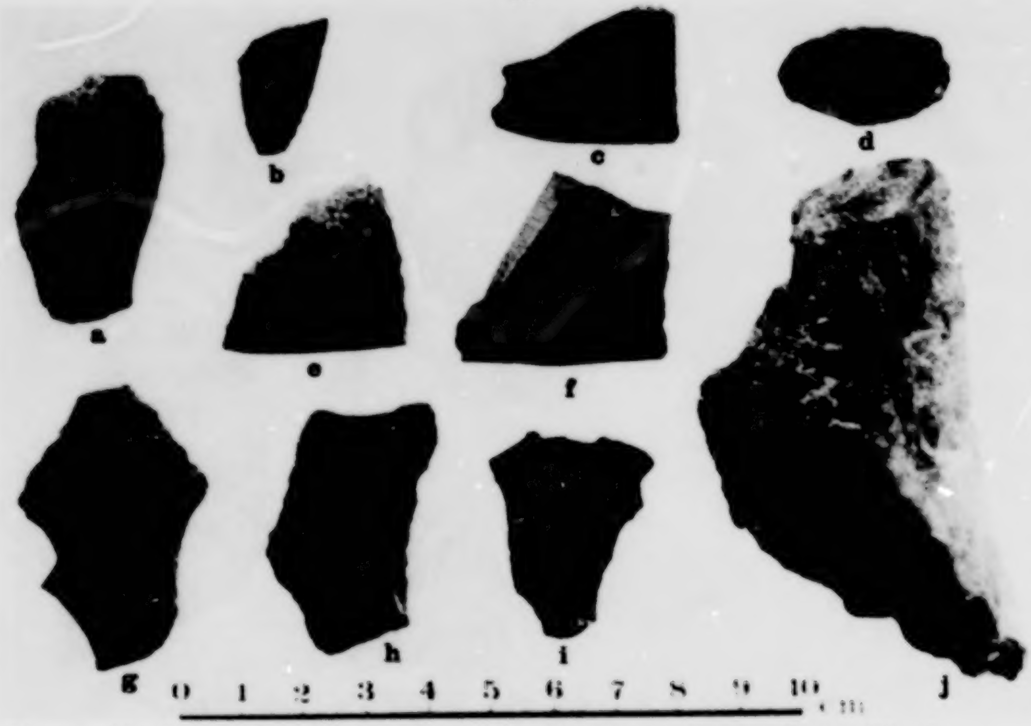


Figure 46: Retouched flakes from the 15-20 cm layer of the Block Excavation. Their Cat. Nos. are 4675 (a), 4807 (b), 2672 (c), 6503 (d), 4544 (e), 4640 (f), 8082 (g), 2438 (h), 7101 (i), and 2864 (j).

Figure 47: Retouched flakes from the 15-20 cm layer of the Block Excavation. Their Cat. Nos. are 5818 (a), 3543 (b), 6645 (c), 4983 (d), 2712 (e), 4375 (f), 3217 (g), and 1999 (h).

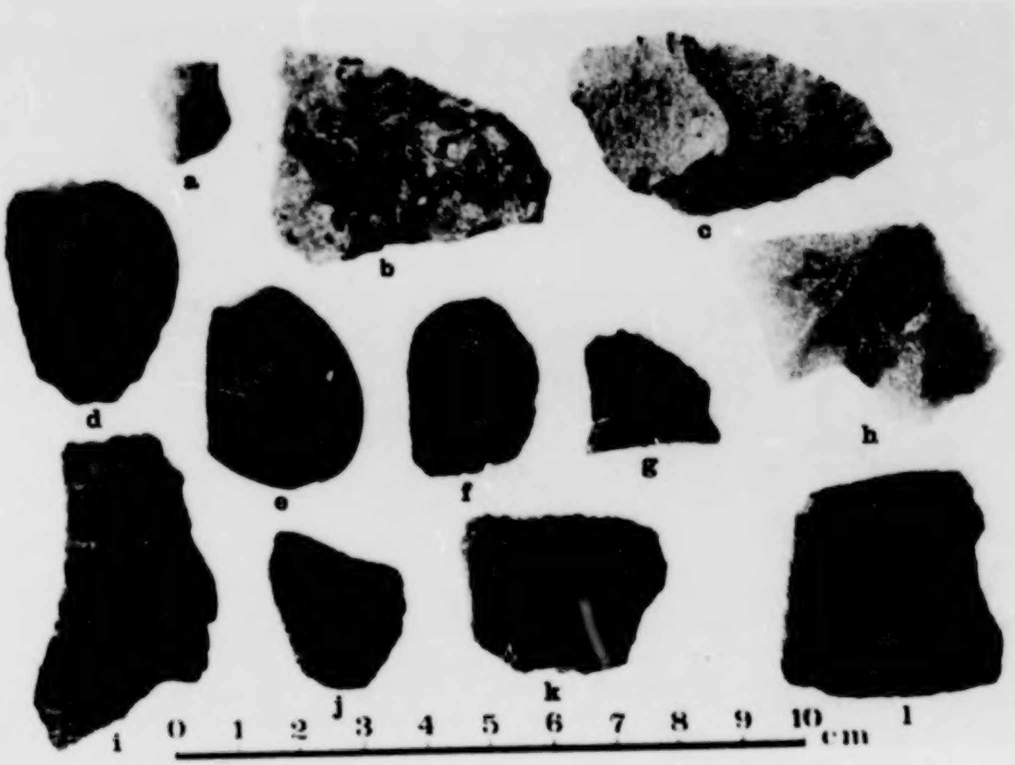

a
b
c
d
e
f
g
h
i
j
k
l
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 48: Retouched flakes from the 20-25 cm layer of the Block Excavation. Their Cat. Nos. are 2774 (a), 8182 (b), 4336 (c), 1504 (d), 5973 (e), 6124 (f), 8424 (g), 4108 (h), 4750 (i), 7431 (j), 2446 (k), and 3494 (l).

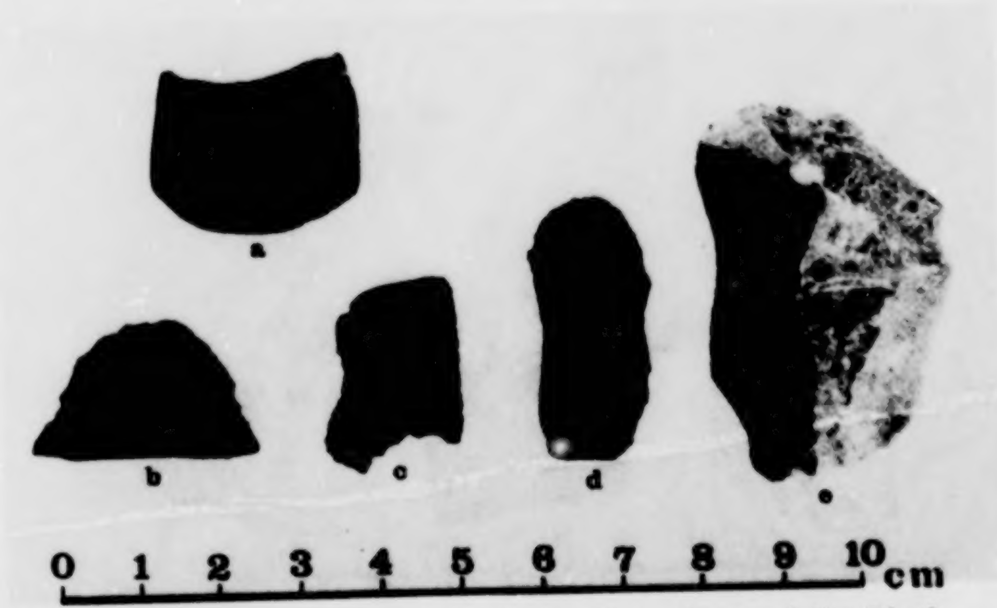

a
b
c
d
e
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 49: Retouched flakes from the 25-30 cm layer of the Block Excavation. Their Cat. Nos. are 1964 (a), 7393 (b), 5255 (c), 8059 (d), and 5158 (e)

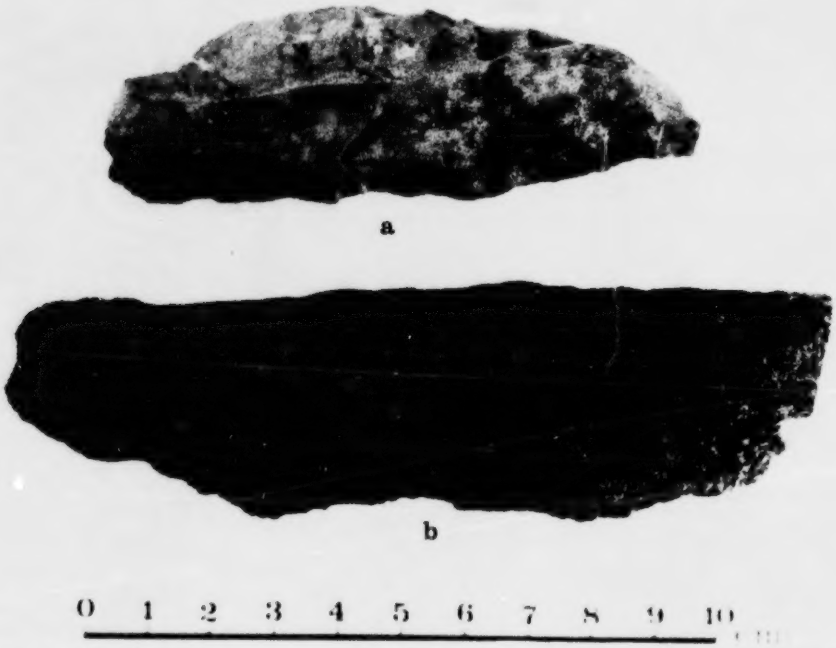

a
b
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 50: Two large reassembled retouched pieces recovered from the 25-30 cm layer of the Block Excavation. Their Cat. Nos. are (3354 & 5408) (a) and (1679 & 1672) (b).

a
b
c
d
e
f
g
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 51: Retouched flakes from the 30-35 cm layer of the Block Excavation. Their Cat. Nos. are 6285 (a), 4955 (b), 3512 (c), 3717 (d), 3511 (e), (5827 & 5650) (f), and 3359 (g).

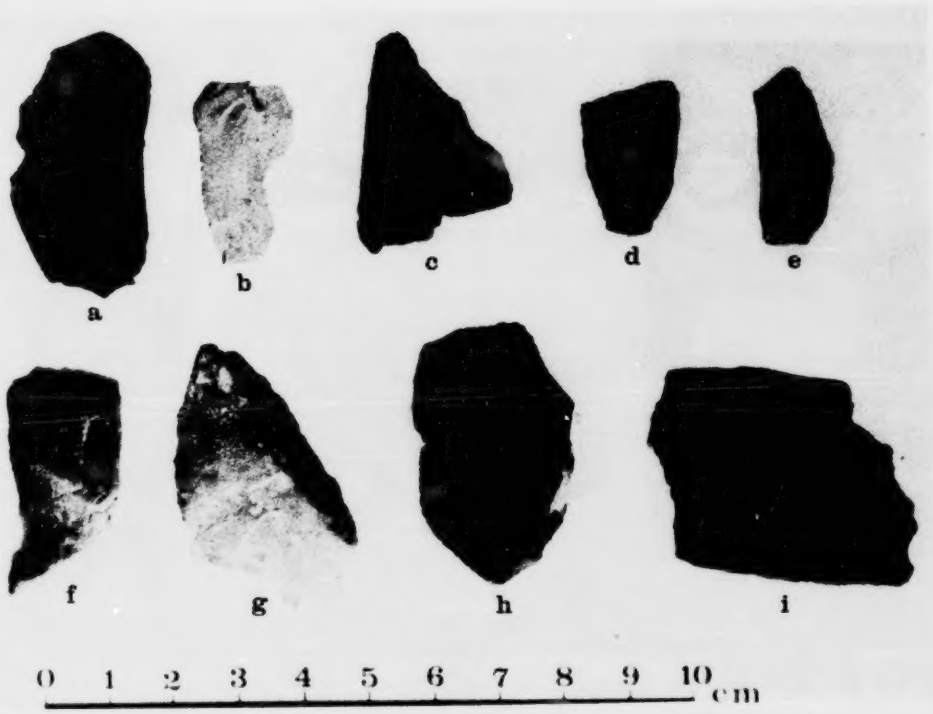

a
b
c
d
e
f
g
h
i
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 52: Retouched flakes from the 35-40 cm layer of the Block Excavation. Their Cat. Nos. are 6148 (a), 7274 (b), 5068 (c), 6390 (d), 5550 (e), 3866 (f), 7182 (g), 6534 (h), and 5317 (i).

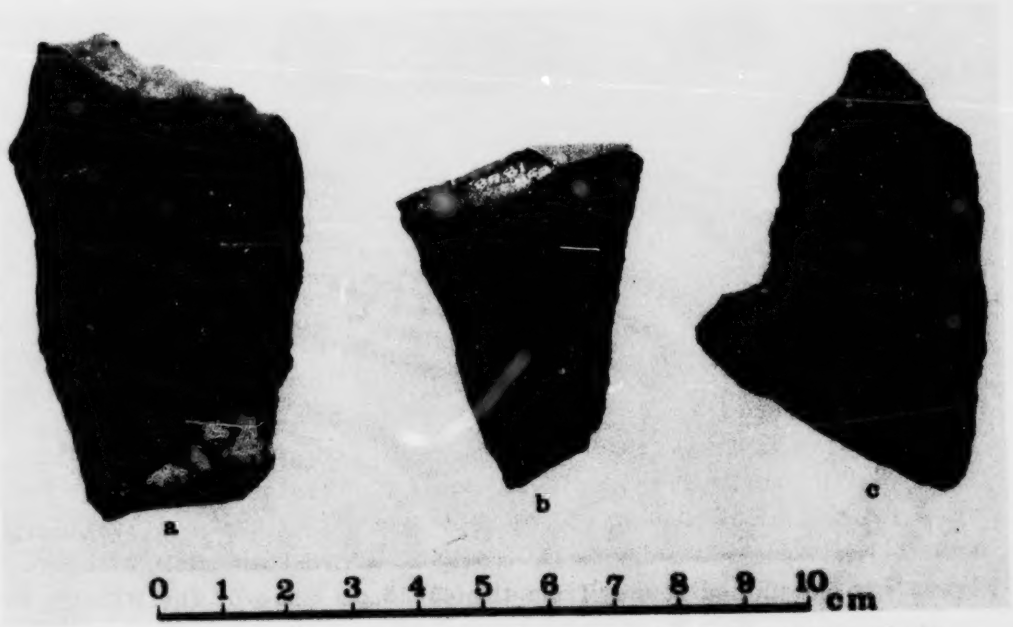

a
b
c
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 53: Large retouched flakes from the 40-45 cm layer of the Block Excavation. Their Cat. Nos. are 3323 (a), 1868 (b), and 3874 (c).

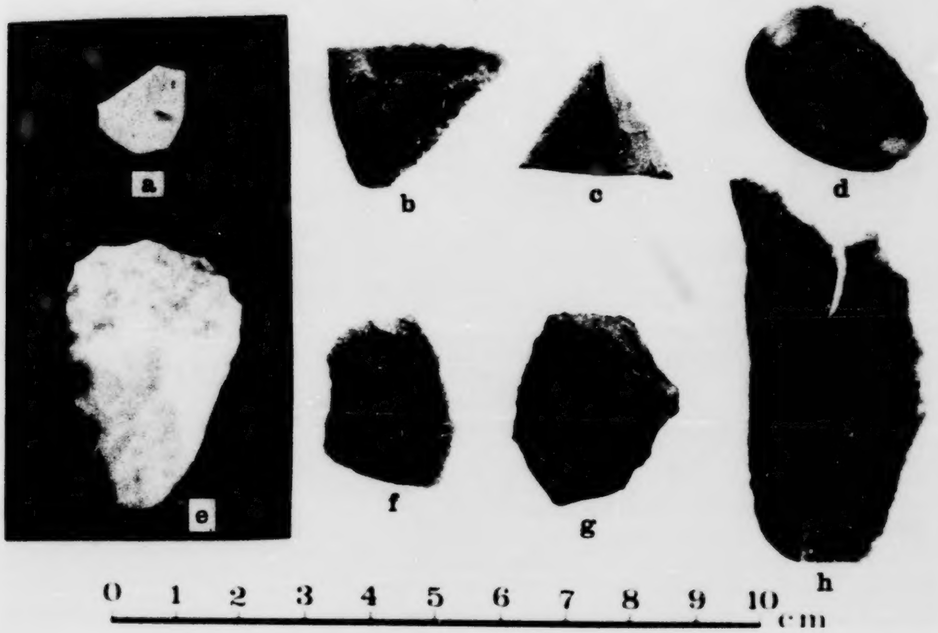

a
b
c
d
e
f
g
h
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 54: Retouched flakes from the 40-45 cm layer of the Block Excavation. Their Cat. Nos. are 1559 (a), 8266 (b), 5553 (c), 6969 (d), 7531 (e), 7077 (f), 3732 (g), and 5768 (h).

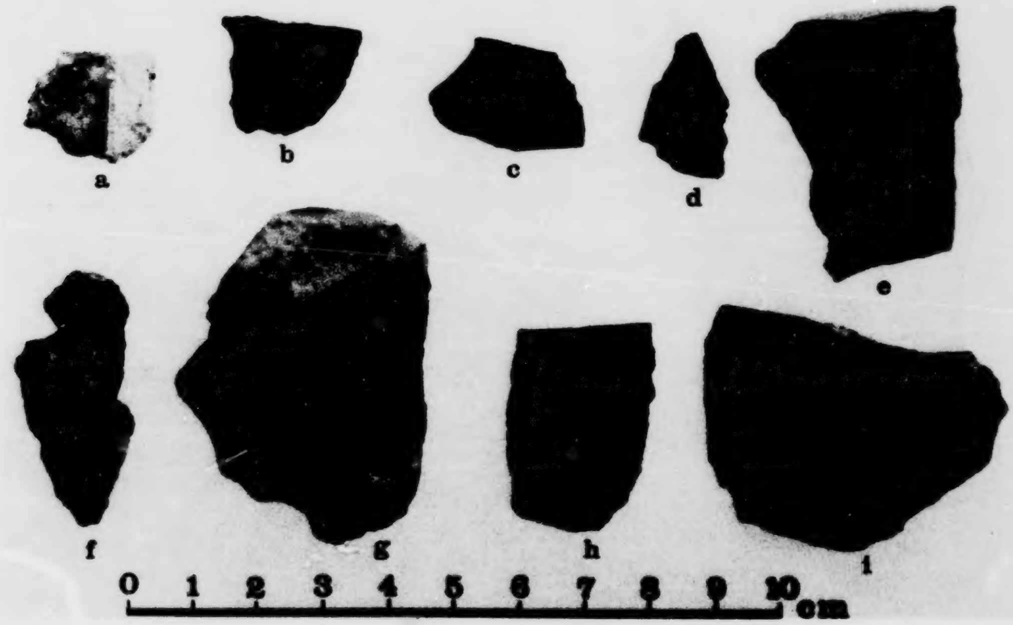

a
b
c
d
e
f
g
h
i
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 55: Retouched flakes from the 45-55 cm zone of the Block Excavation. Their Cat. Nos. are 7136 (a), 1722 (b), 7282 (c), 3433 (d), 8445 (e), (7288 & 7330) (f), 3432 (g), 8538 (h), and 5565 (i).

the most abundant type of retouched flake found in the Block Excavation (Figures 44 a, b, f-i; 45 a, e, h-j and l; 46 b, e-g; 51 c-e; 52 a-e, and g; 53 b; 54 b and c; and 55 a, d, e and h). They fit the Type 1 class of retouched flakes.

Table 15: Retouched flakes from the Block Excavation at site EgPr-2

	Classes									Material								
Levels	1	2	3	4	5	6	7	8	Totals	Quartzite	Cryst. Siltstone	Dull Green Siltst.	Blk. Band. Siltst.	Other Siltstones	Chert/Chalcedony	Pebble Chert	Petrified Wood	Crystal Quartz
0-5	1	1	1	1	-	-	-	2	6	1	2	1	1	-	-	1	-	-
5-10	11	6	1	7	2	-	-	6	33	5	4	2	10	2	6	3	1	-
10-15	11	9	5	1	2	-	-	2	30	2	8	2	7	2	5	4	-	-
15-20	16	8	10	5	4	1	1	1	46	2	6	-	17	3	7	10	-	1
20-25	5	5	3	4	3	3	3	5	31	5	1	-	12	2	5	6	-	-
25-30	5	7	-	4	2	-	-	2	20	2	3	1	4	1	4	4	1	-
30-35	5	5	-	4	1	1	-	2	18	1	6	2	5	1	2	1	-	-
35-40	11	3	1	1	1	-	-	-	17	5	2	3	-	2	1	4	-	-
40-45	6	5	-	5	2	1	1	-	20	1	5	2	3	1	6	2	-	-
45-50	4	3	1	1	-	-	-	-	9	1	-	1	3	2	1	1	-	-
50-55	-	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	-	-
Totals	75	52	22	33	17	7	5	20	231	25	37	14	62	17	37	36	2	1

The second most numerous variety of retouched flakes, Type 2, comprised flakes that were worked along the left lateral edge of the dorsal surface. The 52 examples recovered comprise 22.5 percent of all the retouched flakes recovered from the Block Excavation. Representative examples from various levels are shown in Figures 44 (c and e); 45 (d and m); 46 (c, i and j); 47 (c); 48 (a and b); 49 (c); 51 (a, b, f and g); 52 (f); 53 (a and c); 54 (h); and 55 (g and i). Together, the unilaterally, dorsally retouched flakes made up almost 55 percent of all retouched flakes retrieved from the Block Excavation.

Less frequent were flakes that had been bilaterally retouched along the lateral edges on the dorsal aspect. Twenty two examples (9.5%) of all Type 3 retouched flakes recovered from the Block Excavation, were fashioned in this manner (Figures 45 b, g and k; 46 a and h; 47 b, f and h; 48 l; 52 h; and 55 b). Thirty two examples (13.8 percent) exhibited finishing of the distal end, plus one or both of the lateral edges, on the dorsal surface. They were included in the Type 4 category (Figures 44 d and j; 45 c; 47 d and e; 48 c; 49 b, d and e; 54 e and g; and 55 c).

Surprisingly, 17 flakes were recovered from the Block Excavation which had been retouched on the ventral surface (Figures 45 f; 47 a; 48 i and j; 49 a; 50 a; and 54 f). The practice of alternately beveling a tool by retouching one lateral edge dorsally and the other ventrally was not a common one at EgPr-2. Only seven of these Type 6 examples were discovered in the Block Excavation (Figures 48 h and k; 50 b; 54 a; and 55 f). Bipolarly split pebbles with edge retouching (Type 7) were the least frequent sort of retouched flake represented (N=5, Figures 46 d; 48 d-f; and 54 d). Finally, 20 specimens were too fragmentary to be placed confidently into any of the above classes.

In terms of chronological distribution, those classes of retouched flakes which appear most frequently in the Oxbow zone (15-20 cm and 20-25 cm), with the exception of those with bilateral retouch, are also the most frequent type occurring in the Paleo-Indian zone at 40-45 cm (Table 15). The conclusion appears similar to that reached for the gravers. That is, the fact that the final form of the tool was more a consequence of practical, rather than stylistic, considerations, also seems to apply to the retouched flakes. However, it appears that there were strong cultural biases on the part of the prehistoric craftsmen, and this is best reflected by the choice of lithic materials selected for the production of retouched flakes. For instance, the most frequent use of black banded siltstone shows up in the upper levels in the Block Excavation while, by comparison (Table 15), the 40-45 cm layer registers a relatively high incidence of retouched flakes that had been manufactured from crystalline siltstones and cherts.

The slight reduction in the frequency of retouched flakes in the 30-40 cm zone parallels a similar observation made in regard to the vertical distribution of debitage in the Block Excavation (Figure 19). This lends support to the suggestion that the Sibbald Creek site was less intensively inhabited during the Altithermal Period than at times prior or subsequent to it.

Several of the retouched flakes from the Block Excavation warrant special mention because they possess some unique characteristic. One specimen (Figure 47 f) is made of crystal quartz. The source of this lithic material is probably not local, but likely the bedrock outcrops located within, or west of, the Rocky Mountain Front Range. One of the tools (Figure 47 g) has a blade-like appearance. No other blades, nor a single blade core, were recovered from the Sibbald Creek site. Moreover, since many of the retouched flakes were manufactured from percussion flakes that possessed dorsal ridges, it is likely that the flake selected for the above tool simply has a fortuitous blade appearance.

Another distinctive tool (Figure 30 e) was made from a fine grey siltstone decortication flake. It exhibits steep dorsal retouch on the distal end and a bifacially retouched rounded point on the proximal end. Both lateral edges show irregular pressure trimming. Extensive wear is present on the proximal end and along one lateral edge. The tool was discovered in the Block Excavation in the northeast quadrant of unit 14N 41W at a depth of 45-50 cm.

Seventy one retouched flakes recovered from outside the Block Excavation were classified according to the scheme set up in Figure 43 and sorted as to lithic materials. In regard to the stone used in their manufacture, 29 examples (40.84%) were of black banded siltstone, 11 were of various cherts and chalcedonies, eight were of pebble cherts predominated by very fine grey or black siltstones, nine were of crystalline siltstones, eight were of tan siltstone, and there were five of quartzite and only one of crystal quartz.

The above data reaffirms the conclusion that a relatively high proportion of the retouched flakes from the Block Excavation had been fashioned from flakes of black banded siltstone (Table 15). Since most of the retouched flakes of this material occurred in the upper half of the deposits in the Block Excavation, their relatively high incidence in the rest of the site may simply reflect a more intensive occupation of EgPr-2 by Oxbow and later groups than by the Paleo-Indians.

The collections of retouched flakes obtained from within and outside the Block Excavation were compared statistically (Table 16). Only in one instance does the observed frequency of retouched flakes deviate radically from the expected one, and this is with the Type 1 class of tools collected from outside the Block Excavation. The relatively low Chi-square reading (8.89) suggests that there is no significant difference between the two samples such as might be expected if the activities requiring the use of specific forms of retouched flakeshad been localized, or if a particular culture group showing a preference for one or more tool classes had confined itself to a certain part of the site. The data presented in Table 16 may indicate that both samples reflect quite fairly the entire population of retouched flakes at EgPr-2.

Table 16: Comparison of two samples of retouched flakes from EgPr-2

	Block Excavation			Outside Block Excavation			
Class	obs.	exp.	$\frac{(\text{obs.} - \text{exp.})^2}{\text{exp.}}$	obs.	exp.	$\frac{(\text{obs.} - \text{exp.})^2}{\text{exp.}}$	Total
1	75	68.1	.70	14	20.9	2.27	89
2	52	55.8	.26	21	17.1	.89	73
3	22	22.9	.04	8	7.1	.12	30
4	33	29.8	.34	6	9.2	1.11	39
5	17	20.7	.26	10	6.3	2.17	27
6	7	7.6	.05	3	2.4	.15	10
7	5	4.6	.03	1	1.4	.11	6
8	20	21.4	.09	8	6.6	.30	28
Total	231			71			302

$$X^2 = 8.89, \ df = 7, \ p < .001$$

Some of the retouched flakes recovered from outside the Block Excavation are shown in Figure 56. Included are six Type 1 specimens which display retouching along the right lateral edge on the dorsal aspect (Figure 56 a, b, c, e, f and p); three Type 2 artifacts that show retouching of the left lateral edge (Figure 56 g, h and o); three Type 3 artifacts with bilateral retouching (Figure 56 l, m and n); one Type 4 specimen where the flaking is at the distal end (Figure 56 d); two Type 5 flakes with ventral retouch (Figure 56 j and k); and only one Type 6 artifact where the lateral edges exhibit alternate unifacial retouch (Figure 56 i). Aside from one quartz (Figure 56 a) and three quartzite examples (Figure 56 b, g and j), the rest of the retouched flakes shown are made of various siltstones.

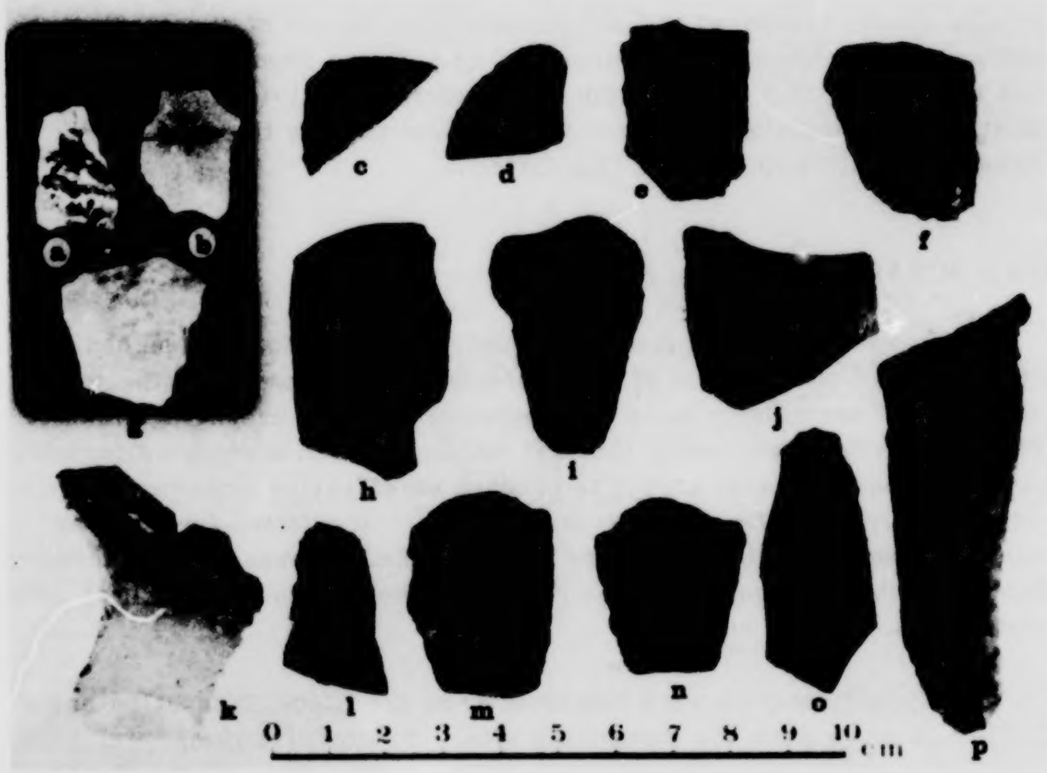

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 56: Retouched flakes recovered from outside the Block Excavation at EgPr-2. In alphabetical order their Cat. Nos. are 742, 557, 1059, 947, 4075, 882, 811, 1066, 4054, 721, (926 & 927), 971, 849, 881, 753 and 3992. One of the tools (a) is made of crystal quartz, three (b, g and j) are of quartzite, and the rest are fashioned of various siltstones.

It seems clear that size and overall configuration were the primary factors which determined whether or not a flake was selected for retouching. The largest retouched flake recovered from outside the Block Excavation (Figure 39 a) is a secondary decortication flake of tan siltstone which has been unifacially worked along the left lateral edge. It measures 88.5 mm long, 45.8 mm wide, and 14.0 mm thick. Despite the seemingly soft nature of the lithic material it is made of, this tool does not display any visible signs of wear along the finished edge. The crystal quartz retouched flake, by comparison, is one of the smallest unifacially retouched tools discovered outside the Block Excavation. It has a length of 22.0 mm, a width of 15.0 mm, and a thickness of 6.5 mm. Most of the remaining retouched flakes found outside the Block Excavation fall within these two extremes.

END SCRAPERS (N=93)

As noted earlier, end scrapers are distinguished from retouched flakes mainly on the basis of configuration and placement of the worked edge. They are usually made from parallel-sided or expanding flakes. The distal end is frequently the part which has been steeply unifacially retouched on the dorsal aspect to produce an effective working edge. Occasionally the lateral edges, or even the entire dorsal surface may exhibit trimming through pressure flaking. Rarely have the end scrapers from the Sibbald Creek site been retouched along both the proximal and distal ends.

Eighty end scrapers were retrieved from the Block Excavation and a further 13 came from the rest of the site. To expedite their description, they were classified according to the shape of the flake, the amount and placement of retouching, and the presence or absence of spurs (Figure 57). The various end scraper types recovered from the Block Excavation were tabulated according to level and lithic material (Table 17). Their qualitative and quantitative attributes are presented in Table Ap-7, Appendix I.

Twenty eight Type 1 end scrapers were found in the Block Excavation (Table 17). They were fashioned from flakes that possessed a central dorsal ridge which gave them a triangular cross section. The lateral edges may or may not have been further modified by retouching. They made up 35 percent of all end scrapers recovered from the Block Excavation (Figures 58 c, e and i; 59 b, e-h, j and k; 60 b; 61 d, e, g and i; 62 a, c, e, f i and j).

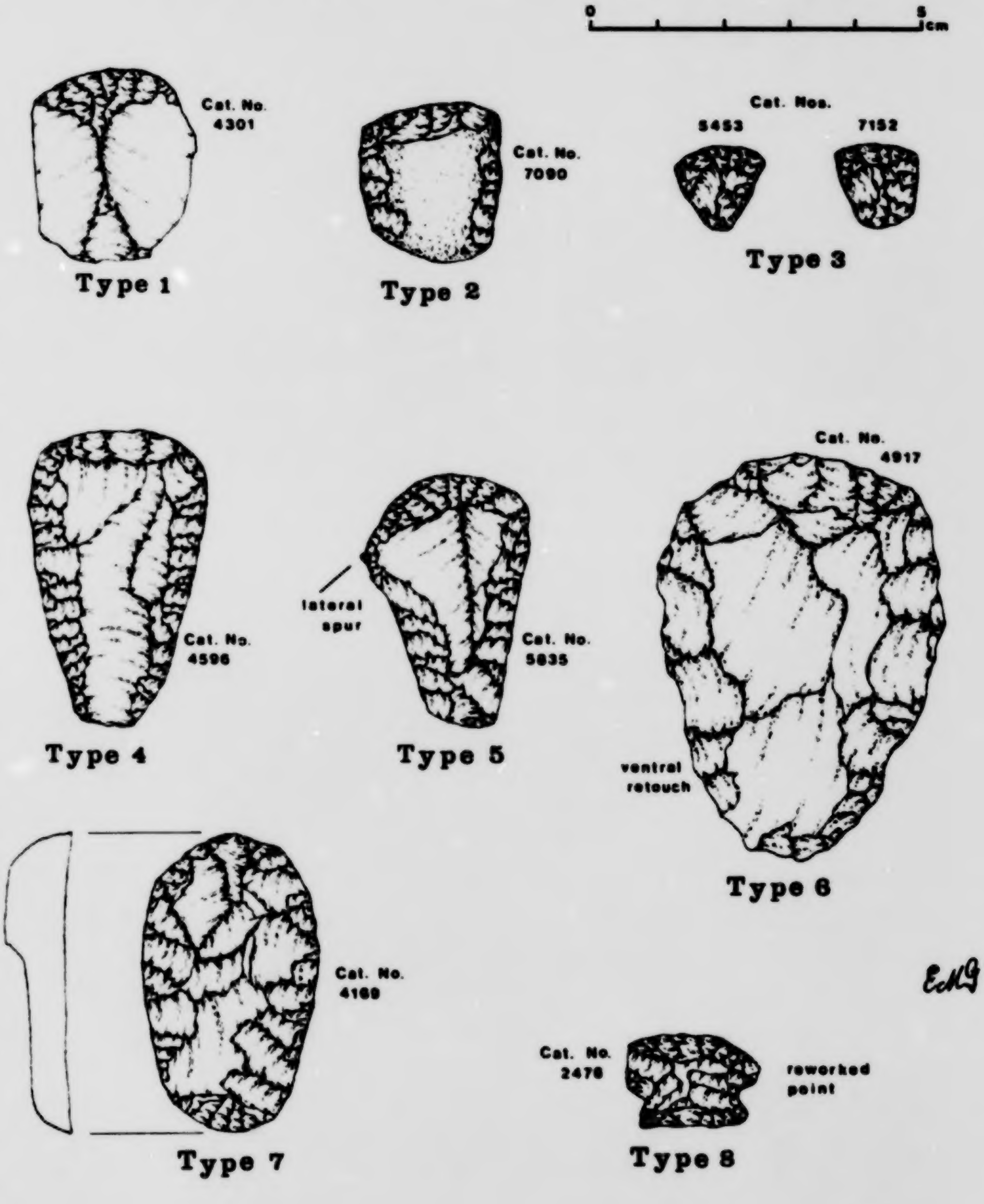

0
5
cm
Cat. No.
4301
Type 1
Cat. No.
7090
Type 2
Cat. Nos.
5453
7152
Type 3
Cat. No.
4596
Type 4
lateral
spur
Cat. No.
5835
Type 5
Cat. No.
4917
ventral
retouch
Type 6
Cat. No.
4169
Type 7
Cat. No.
2476
reworked
point
Type 8

Figure 57: Classification of end scrapers from the Block Excavation.

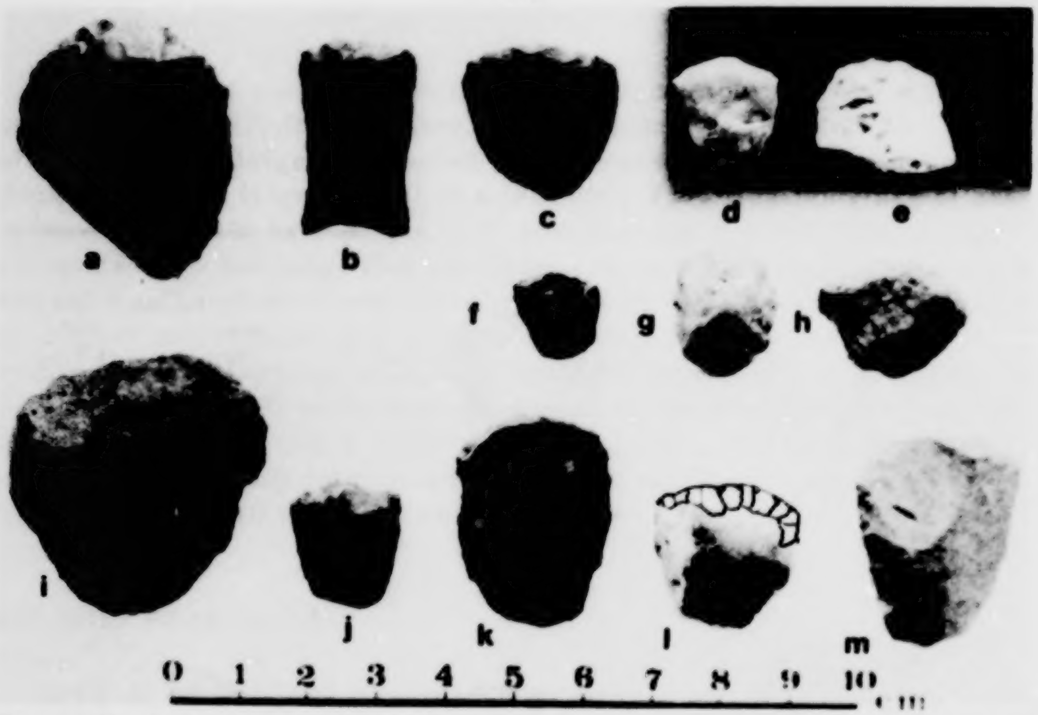

a
b
c
d
e
f
g
h
i
j
k
l
m
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 58: End scrapers from the 0-10 cm layer of the Block Excavation. Their Cat. Nos. are 7736 (a), 6488 (b), 3781 (c), 7413 (d), 6301 (e), 5453 (f), 3790 (g), 7570 (h), 1482 (i), 1453 (j), 3845 (k), 5034 (l), and 1371 (m).

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 59: End scrapers from the 10-15 cm layer of the Block Excavation. Their Cat. Nos. are 7152 (a), 6989 (b), 6745 (c), 6639 (d), 2705 (e), 2800 (f), 3294 (g), 7514 (h), 1881 (i), 3337 (j), (6495, 6513, & 6496) (k), 4798 (l), 3801 (m), 4633 (n), and 6920 (o).

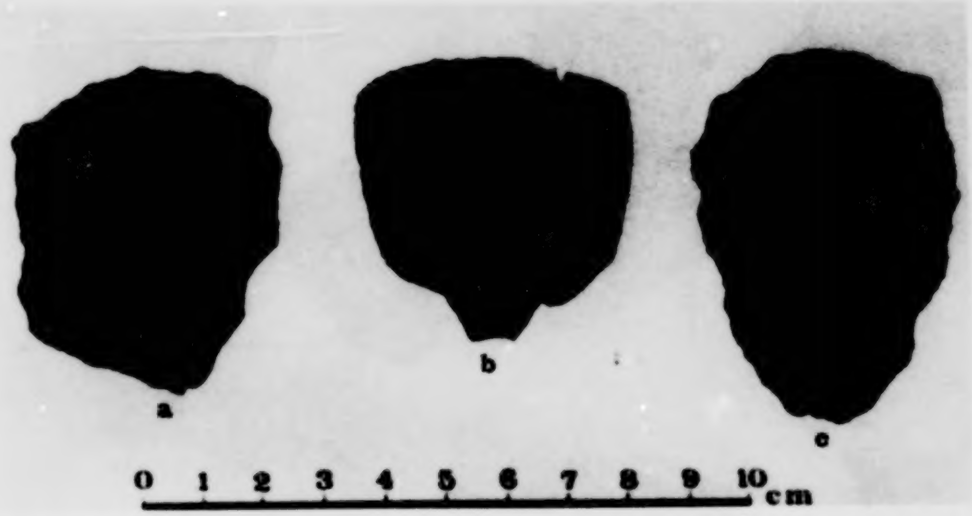

a
b
c
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 60: Three large end scrapers recovered from the 10-20 cm zone of the Block Excavation. Their Cat. Nos. are 3216 (a), (3259, 3386, 5416 & 6994) (b), and 4917 (c). The middle example was reassembled from eight fragments.

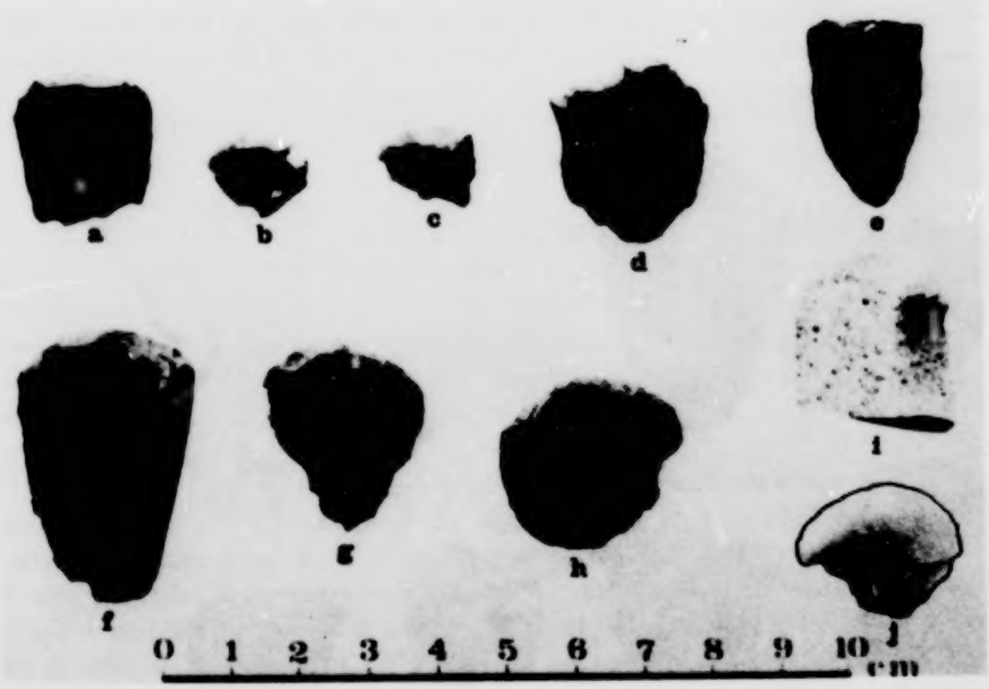

a
b
c
d
e
f
g
h
i
j
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 61: End scrapers from the 20-35 cm zone of the Block Excavation. Their Cat. Nos. are 6710 (a), 8402 (b), 4116 (c), 3667 (d), 6871 (e), 2888 (f), 6475 (g), 3860 (h), 4618 (i), and 4954 (j).

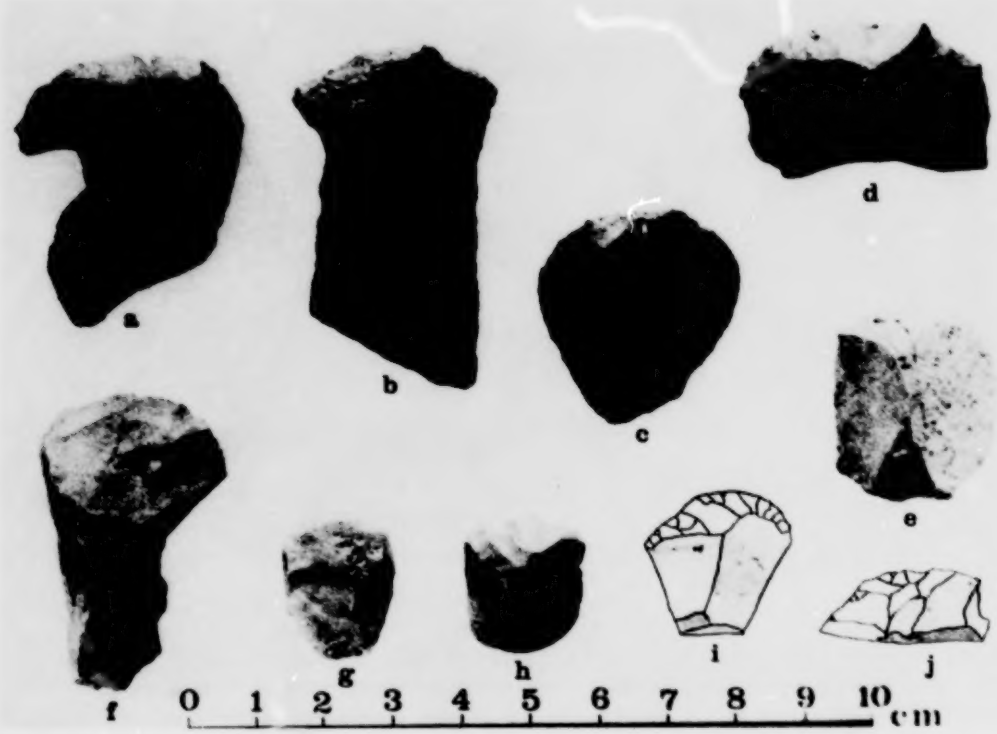

a
b
c
d
e
f
g
h
i
j
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 62: End scrapers from the 35-40 cm zone of the Block Excavation. Their Cat. Nos. are 5490 (a), 3571 (b), 4455 (c), 8440 (d), 4301 (e), 1929 (f), 3576 (g), 3679 (h), 6430 (i), and 7371 (j).

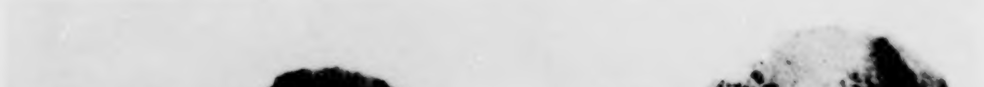

a
b
c
d
e
f
g
h
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 63: End scrapers from the 40-45 cm layer of the Block Excavation. Their Cat. Nos. are 4148 (a), 8451 (b), 4898 (c), 5621 (d), 5016 (e), 6396 (f), 7590 (g) and 4627 (h). Note the spurs on a, b, e, f & h.

Table 17: End scrapers from the Block Excavation

	Classes									Material							
Level	1	2	3	4	5	6	7	8	Totals	Quartzite	Cryst. Siltstone	Bl. Band. Silt.	Other Siltstone	Chert/Chalcedony	Pebble Chert	Petrified Wood	Crystal Quartz
0-5	2	-	1	1	-	-	-	-	4	-	-	1	1	2	-	-	-
5-10	2	3	2	2	-	-	-	-	9	1	1	1	1	4	-	-	1
10-15	8	3	2	4	-	1	-	1	19	1	2	3	-	6	6	1	-
15-20	3	2	1	3	-	-	1	-	10	-	1	4	-	3	2	-	-
20-25	4	-	-	4	-	-	-	1	9	1	2	1	1	1	3	-	-
25-30	-	-	3	-	-	-	-	-	3	-	-	-	-	3	-	-	-
30-35	2	-	1	3	-	-	-	-	6	-	1	2	-	2	1	-	-
35-40	5	-	1	1	1	-	-	-	8	-	1	-	1	4	2	-	-
40-45	1	1	-	1	3	-	-	-	6	-	-	2	-	3	1	-	-
45-50	1	3	-	-	2	-	-	-	6	-	-	-	1	2	3	-	-
Totals	28	12	11	19	6	1	1	2	80	3	8	14	5	30	18	1	1

Type 4 end scrapers, that is, those which had attributes similar to those of the above type but differed in the respect that they were fashioned from flat flakes that were essentially rectangular in cross section, were the next most frequent type. Nineteen examples were recovered from the Block Excavation (Figures 58 b, k and l; 59 c, d, i and m; 60 a; 61 f and h; 62 b; and 63 c).

Of almost equal relative proportions were end scrapers that were manufactured from split pebbles (Type 2) and those which had been retouched over most or all of the dorsal surface (Type 3). Twelve Type 2 and 11 Type 3 end scrapers were recovered from the excavations. Type 2 end scrapers are shown in Figures 58 (h and m), 59 (l, n and o), 62 (g and h), 63 (d and g); Type 3 end scrapers are illustrated in Figures 58 (a, d, f, g and j), 59 (a), 61 (a, b, c and j), and 62 (d).

The six examples of Type 5 end scrapers are characterized by having sharp projections or "spurs" on one or both sides of the distal end (Figures 57 and 63 a, b, e, f and h). Only one of these eared end scrapers (Figure 63 b) shows smoothing of the projections. However, it also displays evidence of marked wear on the lateral and distal edges of the tool, so the smoothing may well have resulted from the normal use of the end scraper rather than through some special function.

Like gravers, so too are eared end scrapers conspicuous elements in Paleo-Indian assemblages, occurring from Clovis to Frederick times on the Plains (Irwin and Wormington 1970:Table 1). A single spurred variety is illustrated from the Elida site, a Folsom campsite in eastern New Mexico (Hester 1962:Figure 9). Double spurred examples are reported from the Hussey site near Georgian Bay, Ontario (Storck 1979:Plate 20) and in relatively great abundance at the Debert site in Nova Scotia (MacDonald 1968:90-93 and Plate XIII). Their temporal or cultural and geographic distributions appear to be as widespread as that of gravers. Referring to written and verbal scurces, MacDonald (ibid:93) mentions that the spurred end scrapers persisted into the Archaic Period in the Southeastern Woodlands and are equally widespread in the later levels throughout the Arctic, from Alaska to Greenland.

Table 18: Spurred end scrapers from the Block Excavation at EgPr-2

Cat. No.	Provenience	Lithic Material	Figure
4148	15N 34W SE 45-50	dark grey pebble chert	63 a
4627	15N 36W NE 40-45	black siltstone	63 h
5016	15N 38W SW 40-45	dark grey pebble chert	63 e
5835	15N 42W NE 35-40	mottled yellow-grey chert	57
6396	16N 36W SE 40-45	black banded siltstone	63 f
8451	17N 39W SE 45-50	dark grey pebble chert	63 b

Some of the basic data on the six eared end scrapers from EgPr-2 is presented above in Table 18 and more detailed information is contained in Table Ap-7, Appendix I. The dark grey pebble chert used in the manufacture of three of the implements is in reality a very fine-grained compact siltstone or mudstone that breaks with a conchoidal fracture.

The Type 6 variety is represented by only one example that had been steeply worked on the ventral aspect (Figure 60 c). In fact, cobble cortex forms the underside of the tool. This artifact far exceeds in size the more common end scrapers recovered from the excavations at EgPr-2. The dimensions of this quartzite example are: length 60.4 mm, width 42.8 mm, and thickness 13.2 mm. As a comparison, one of the smaller end scrapers (Figure 58 f) measures only 12.3 mm long, 12.1 mm wide, and has a thickness of 5.4 mm. It shows overall retouching on the dorsal aspect and has been repeatedly resharpened to the extent that it is almost too small to be grasped in the hand or fitted into a handle.

Two other exceptionally large end scrapers (Figure 60 a and b) came from roughly the same stratigraphic zone as did the above quartzite example. Because of their generally similar shape, one would suspect that all three implements had been fabricated either by the same person or by people of a particular cultural group, possibly Oxbow. The chert example (Figure 60 b) was reconstructed from at least eight pieces. The implement had shattered, perhaps as a result of being in a fire. The fragments were dispersed vertically through the deposits between the 5-10 cm and 30-35 cm levels, but concentrated in the 10-15 cm and 20-25 cm levels. The width of this relatively massive chert tool is 45.1 mm, and that of the equally large black banded siltstone example, 44.2 mm.

One specimen (Figure 57) has been retouched all around and steeply worked on both the proximal and distal ends. On the ventral surface pressure flakes had been removed from all edges, with the exception of one lateral side. The tool, made of black siltstone, is classed as a Type 7 end scraper. It measures 43.5 mm long, 26.7 mm wide and has a thickness of 10.6 mm. Only the distal end shows some use polish. The artifact came from the southwest quadrant of 15N 34W at a depth of 15-20 cm.

Two points (Figures 22 c and 25 h) have been reworked into hafted end scrapers. They are the only representatives of the Type 8 end scrapers from EgPr-2. The first example is a small chalcedony Besant point base and the other specimen is a possible Mount Albion point base which had been fashioned from a grey translucent chert or chalcedony. No dulling of the scraping edge is visible on either artifact; however, tiny flake scars are present on the distal end of each specimen suggesting that both had been heavily used. Specific details on the quanitative and qualitative attributes of these two tools could be obtained from Table Ap-2, Appendix I.

An examination of the lithic material used in the manufacture of the end scrapers (Table 17) shows that a high emphasis was placed on cherts and chalcedonies (37.5%) and only a relatively low use was made of black banded siltstones (17.5%). By comparison, only 16.0 percent of the retouched flakes were made of cherts and chalcedonies while a relatively high proportion (26.83%) were of black banded siltstone. This difference in material preference may be a result of functional differences between these two general tool categories. Another apparently favoured material selected for end scrapers is a very fine-grained siltstone or mudstone (Table 17).

Thirteen end scrapers were recovered from outside the Block Excavation. All fall within the types established above. Four were of the Type 1 variety, seven could be assigned to the Type 4 class, and there was one each of Type 2 and Type 3. Only three of the end scrapers were made of chert while the remaining 10 were of various siltstones and mudstones (Figures 40 a-k).

SIDE SCRAPERS (N=20)

Side scrapers were arbitrarily distinguished from retouched flakes primarily on the basis of size. But, in reality, many of the side scrapers were fashioned from massive flakes and, thus, one might question the wisdom of making this distinction. Perhaps there was a functional difference between the large and the small unifacially retouched tools. The larger side scrapers may have served in the preparation of hides and in rough wood working while the smaller retouched flakes could have been employed in tasks requiring a more delicate touch.

However, regardless of their function, the 20 side scrapers recovered from the Sibbald Creek site were sorted according to the technological criteria used in the classification scheme that had been established for the retouched flakes (Figure 43). Other fundamental information on the side scrapers is given in Table 19. Some of the specimens are shown in Figures 64 to 68.

Five of the side scrapers, in particular, (Figures 65 and 66) warrant special attention because of their occurrence in the lower part of the deposits (Table 19) and their resemblance to similar tools recovered from the Hanson Folsom site in northern Wyoming (Frison 1978:Figures 4.12, 4.13 and 4.14). The grey quartzite artifact (Figure 65 a) was found in the 30-35 cm level at EgPr-2. However, two scatterings of reject flakes of a similar lithic material were encountered in the 40-45 cm level, and it is believed that the side scraper had been vertically displaced. The other example shown in Figure 65, a dull green crystalline siltstone tool came from the 35-40 cm layer. Three bifaces (Figure 36) and several concentrations of chipping detritus of

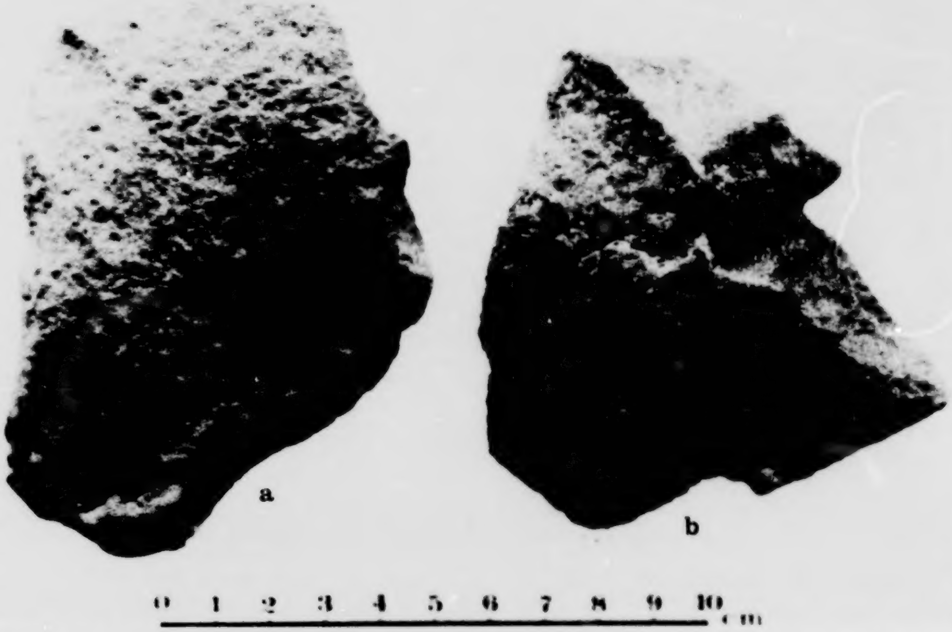

a
b
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 64: Two massive retouched flakes (side scrapers) recovered from the upper layers at EgPr-2 outside the Block Excavation. Their Cat. Nos. are 523 (a) and 1027 (b).

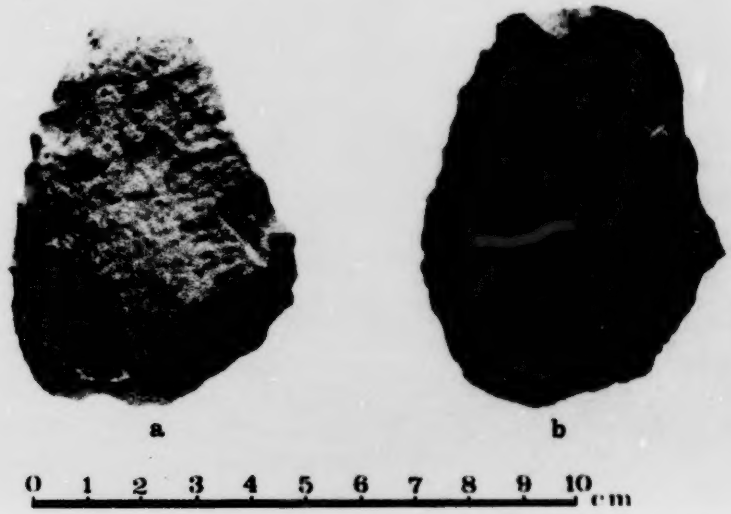

a
b
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 65: Two side scrapers, Cat. Nos. 6284 (a) and 6338 (b), from the lower levels of the Block Excavation. Note the crude retouching evident of the left side of both specimens.

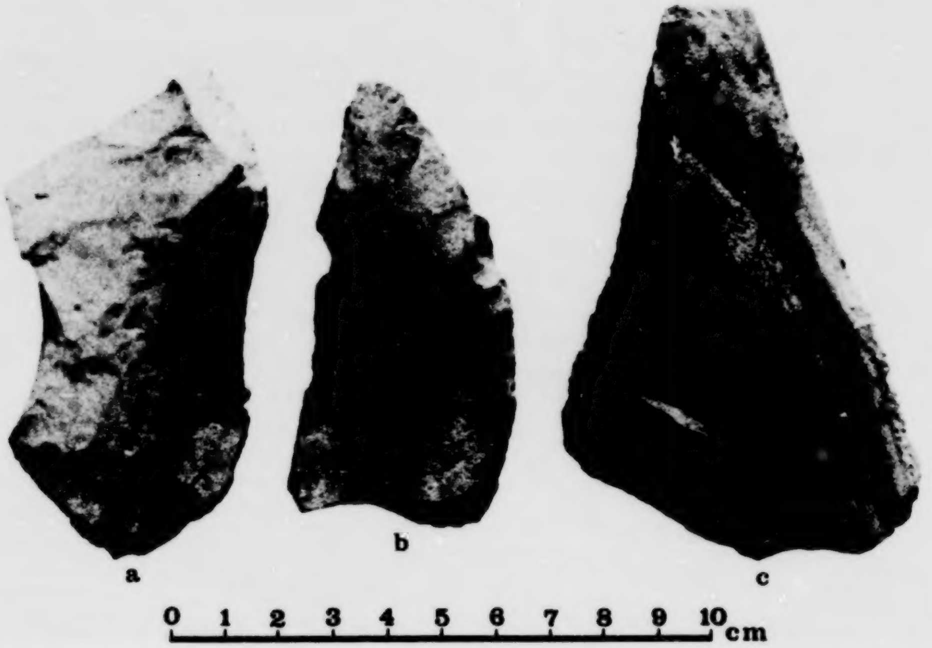

a
b
c
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 66: Retouched massive siltstone flakes (side scrapers) from the 40-45 cm level of the Block Excavation. Their Cat. Nos. are 5552 (a), 5551 (b), and 5861 (c).

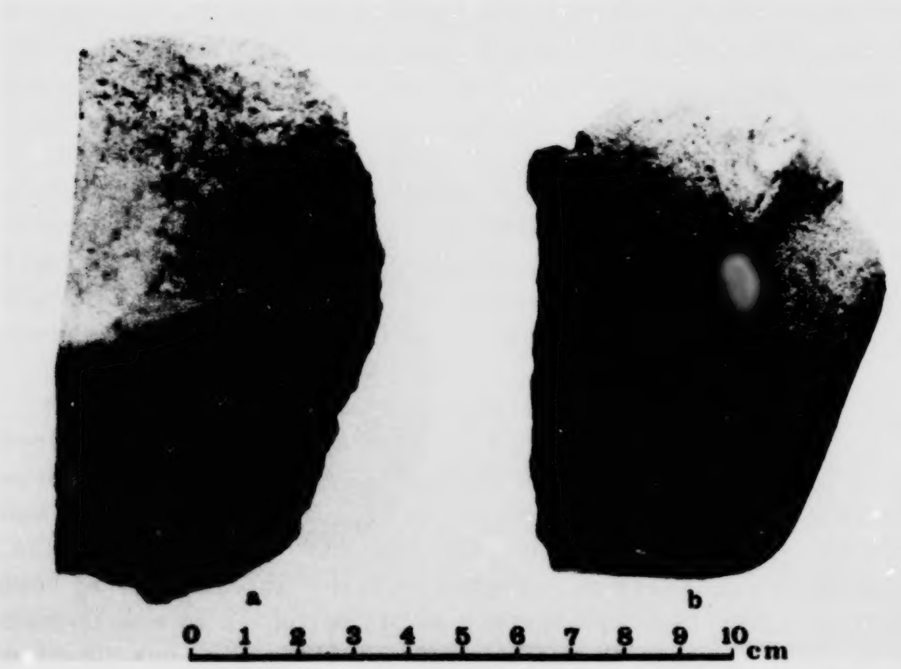

a
b
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 67: Siltstone side scrapers recovered from the 40-45 cm layer of the Block Excavation. Their Cat. Nos. are 7912 (a) and 6962 (b).

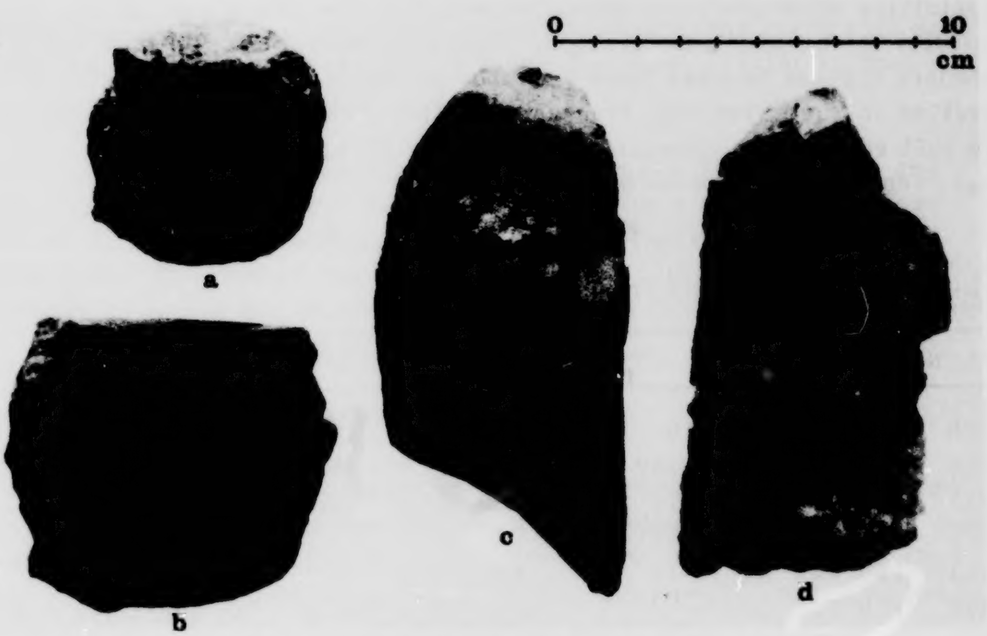


Figure 68: Large tools recovered from the Block Excavation. Cat. No. 5923 (a) is a quartzite scraper plane from the 25-30 cm level, 6806 (b) and 7275 (d) are side scrapers from the 20-25 and 40-45 cm layers, and 6170 (c) is a core chopper from the 10-15 cm level. The last three tools are of siltstone.

Figure 69: Massive, unifacially flaked, quartzite cobble chopper, Cat. No. 4284, from the 20 cm level of the Block Excavation.

crystalline siltstone were also discovered in the lower part of the deposits in the Block Excavation. The working edge on both of the side scrapers appears to have been executed by crude percussion flaking that resulted in excessive step fracturing. This is especially visible along the left edge of the quartzite tool (Figure 65 a). None of the implements reflect traces of use wear.

Table 19: Side scrapers from site EgPr-2

Cat. No.	Provenience	Type	Length	Width	Thick.	Material	Figure
6629	16N 37W SW 5-10	2	116.4	71.3	19.0	quartzite	-
523	12N 32W SW 10-15	5	104.9	78.5	25.6	tan siltstone	64 a
1027	12N 49W SW 10-15	2	82.2	92.1	12.2	tan quartzite	64 b
2075	13N 44W NE 10-15	8	78.0	52.3	21.2	pink quartzite	-
2083	13N 44W NE 10-15	5	113.0	60.2	15.2	dull gr. siltst.	-
6806	16N 38W SE 20-25	2	73.3	83.1	26.0	tan quartzite	68 b
6662	16N 37W SW 25-30	3	58.8	48.0	14.6	tan quartzite	-
2233	14N 29W NW 30-35	5	63.5	55.6	24.6	grey siltstone	-
6284	16N 35W NE 30-35	5	72.1	52.1	22.7	grey quartzite	65 a
6338	16N 35W NW 35-40	2	72.7	55.6	13.0	cryst. siltst.	65 b
6826	16N 38W SE 35-40	5	120.5	101.2	19.5	pink quartzite	-
7912	17N 35W SE 35-40	4	100.2	99.0	40.0	tan siltstone	67 a
7988	17N 35W NE 35-40	8	50.0	26.2	17.0	green quartzite	-
4782	15N 37W SW 40-45	3	65.0	44.5	13.0	grey quartzite	-
5551	15N 40W NW 40-45	1	82.6	38.7	8.0	tan siltstone	66 b
5552	15N 40W NW 40-45	1	87.0	48.0	10.6	tan siltstone	66 a
5861	15N 42W NW 40-45	6	105.2	64.0	17.3	tan siltstone	66 c
6962	16N 38W NE 40-45	2	90.2	65.6	21.1	tan siltstone	67 b
7275	16N 40W SE 40-45	3	116.2	64.1	25.0	cryst. siltst.	68 d
8444	17N 39W SE 40-45	8	70.6	45.7	15.8	grey quartzite	-

The other three side scrapers (Figures 66 a to c) were recovered from the 40-45 cm layer. Two smaller examples were fashioned from relatively thin flakes of a highly weathered siltstone which, beneath the tan surface, is a dark brownish-black colour. The smaller of the two examples bears steep dorsal retouching along part of the lateral edge and ventral retouch along the remainder of the side. The larger tool shows bilateral dorsal retouching. Neither artifact displays signs of extensive use wear. The third example (Figure 66 c) was made from a massive prepared platform flake of a banded tan siltstone. It exhibits alternate unifacial lateral edge retouching on both the dorsal and ventral aspects. The retouch on the dorsal aspect (the right side seen in Figure 66 c) is characterized by hinge fractures similar to that witnessed on the tools shown in Figure 65.

The two tools shown in Figure 67 also display crude flaking and excessive step fracturing. Both were made from a very fine-grained soft tan siltstone. The stone could be easily incised with a metal instrument. Because of the soft nature of the lithic material it is difficult to say if the smoothing present along the edges resulted from use or from natural weathering.

SCRAPER PLANES (N=4)

Four relatively thick flakes or pieces had been percussion flaked unifacially to produce rather narrow, convex-edged tools. Two of these (Cat. Nos. 4805 and 5923) were made from decortication spalls. They were flaked on the ventral surface, leaving the cobble cortex as the underside of the tool. The smaller implement (Figure 68 a) is of quartzite and is worked at both ends. It came from the 25-30 cm layer in the southeast quadrant of 16N 34W. It measures 61.0 mm long, 58.2 mm wide, and 20.5 mm thick. The larger example (Cat. No. 4805, not illustrated) was fashioned from a dull green siltstone. The flaking is restricted mainly to the shaping of one end and trimming of the lateral edges. It was found in the northeast quadrant of 15N 37W at a depth of 15-20 cm. It has a length of 102.6 mm, a width of 59.9 mm, and a thickness of 25.2 mm. Judging by the presence of smoothing evident on the cortex surface along the retouched convex edge, it is suspected that these tools were used as push planes.

The other two examples of scraper planes (Cat. Nos. 2088 and 5946) were fabricated from crystalline siltstone and a dark grey siltstone, respectively. They represent unifacially retouched pieces. The crystalline siltstone example (Cat. No. 2088) shows steep retouching along 43 mm of one edge while the opposite side is bifacially trimmed. The angle of the plane is in the order of 65 degrees. The edge is sharp and sinuous and does not show any visible signs of wear. The tool is 50.5 mm long, 56.4 mm wide and 32.0 mm thick. The other implement was crudely flaked around 66 percent of its circumference. The edge angle varies from almost 90 to less than 40 degrees. This implement also shows no evidence of heavy use. It is 56.0 mm long, 43.5 mm wide, and 24.0 mm thick. Both items were found in the Block Excavation, the crystalline siltstone implement at a depth of 20-25 cm and the other specimen at a depth of 40-45 cm.

WEDGE (N=1)

A flat, rectangular piece of petrified wood was bifacially flaked at one end into a wedge (Figure 40 q). The opposite end exhibits crushing such as that which might have been brought about if the tool had been struck by a wooden billet. Its flat, rectangular shape is the result of the natural cleavage of the petrified wood. The functional end has maintained a fairly sharp edge. The artifact was discovered in the northeast quadrant of 14N 44W in the 15-20 cm layer. It measures 60.6 mm long, 17.3 mm wide, and 8.8 mm thick.

CHOPPERS (N=38)

The chopper tool industry at the Sibbald Creek site is comprised of heavy implements which were made by percussion flaking. The worked edge on many of these tools exhibits marked signs of battering and crushing. Three general types of choppers were recognized among the 38 examples found at the site: those made on large spalls or split cobbles, items which were worked from large cores and pieces, and choppers that were fashioned from cobbles to the extent that a good portion of the cortex surface still remained. The vertical distribution of the three types of choppers retrieved from the Block Excavation is given in Table 20.

Table 20: Distribution of cobble choppers from the Block Excavation

	Level									
Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Split cobble	-	1	-	1	1	2	-	-	2	-
Cobble Chopper	-	1	-	2	1	-	3	1	5	1
Core Chopper	-	1	1	-	2	1	1	2	3	-
Totals	0	3	1	3	4	3	4	3	10	1

The split cobble choppers, of which there were seven examples, have a more or less flat ventral side while the dorsal aspect comprises the rounded cortex surface. Crude percussion flaking is restricted mainly to the ventral aspect (Figures 69; 70 a and b; and 71 a). The hammer blows appear to have been directed largely toward the center of the ventral surface and this has resulted in the removal of relatively flat flakes. As a consequence, the choppers have fairly acute edge angles, ranging between 30 and 37 degrees. Were it not for the presence of unifacial retouching and extensive battering, some of the tools would compare quite favourably with the teshoa described from the Gull Lake site (Eyman 1973:80). Eyman does acknowledge that the resharpened teshoa do, in fact, integrate with choppers. The smallest complete split cobble chopper has a length of 135.0 mm, a width of 102.9 mm, and a thickness of 35.5 mm. By comparison, the largest tool of this category is 192.0 mm long, 154.5 mm wide, and 49.2 mm thick. All but one of these choppers are made of quartzite; the exception is fashioned from a softer lithic material, a tan siltstone.

Fourteen cobble choppers were recovered from the Sibbald Creek site. They varied from cobbles that displayed only minimal modification through the removal of a few flakes (Figure 72), to those where much of the cortex has been knocked off (Figure 71 b). Indeed, there is no clear division between cobble and core choppers. Three of the cobble choppers (Cat. Nos. 4678, 5367 and 6418) were fashioned from flat, tabular pieces of fine-grained quartzite. In terms of the lithic material utilized for their production, three of the cobble choppers were made from dull green crystalline siltstone, one was of a grey siltstone, two were manufactured from a soft tan siltstone, and the remainder were of various quartzites. The 18 cobble choppers ranged in weight from 364.7 gm to 1602.2 gm, with a mean of 943.46 gm, and a standard deviation of 385.05 gm.

Twelve core choppers were recovered from EgPr-2; 11 of them came from the Block Excavation (Table 20). Were it not for the battered bifacially or unifacially flaked edge one might easily mistake these items for cores (Figures 68 c; 73 a and b; and 74). They were found in most of the levels in the Block Excavation (Table 20). As with the cobble choppers, a relatively high number of core choppers (eight) were made of quartzite. In addition, there were two of grey siltstone and one of tan siltstone. The core choppers also displayed a wide range of sizes and weight. One of the smallest implements (Figure 68 c) measures 128.2 mm long, 61.5 mm wide, and 27.0 mm thick. In contrast, the largest one (Figure 74) is 164.0 mm long, 114.5 mm wide, and 52.3 mm thick. The core choppers ranged in weight from 294.4 gm to 1390.2 gm, with a mean of 738.7 gm, and a standard deviation of 411.03 gm.

Choppers were recovered from almost every level of the Block Excavation (Table 20). They were especially concentrated in the 40-45

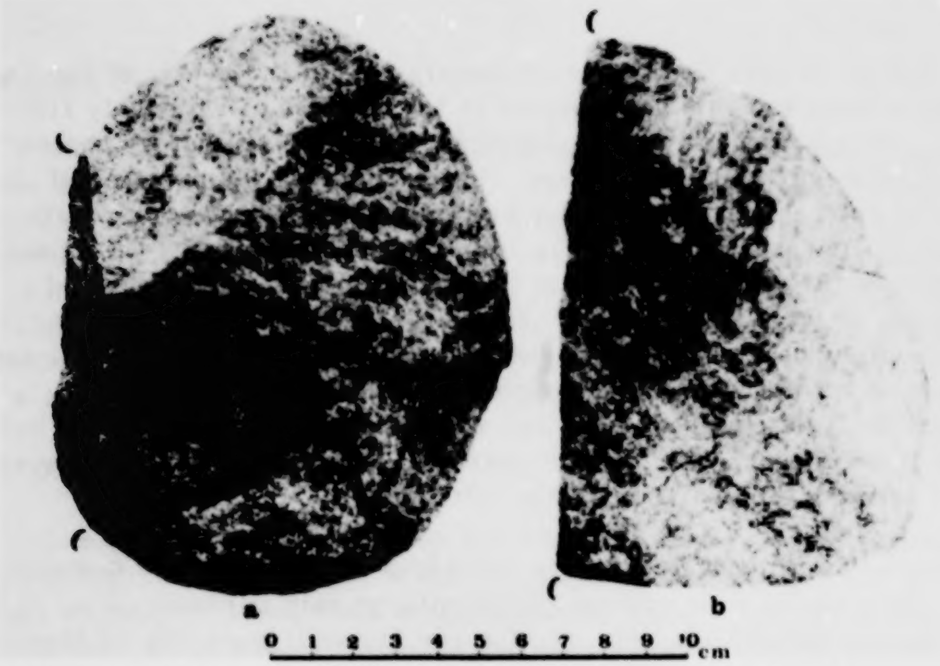


Figure 70: Split quartzite cobble choppers from the Block Excavation. The first specimen (a, Cat. No. 7329) came from the 40-45 cm layer; the other example (b, Cat. No. 3797) was found in the 5-10 cm level.

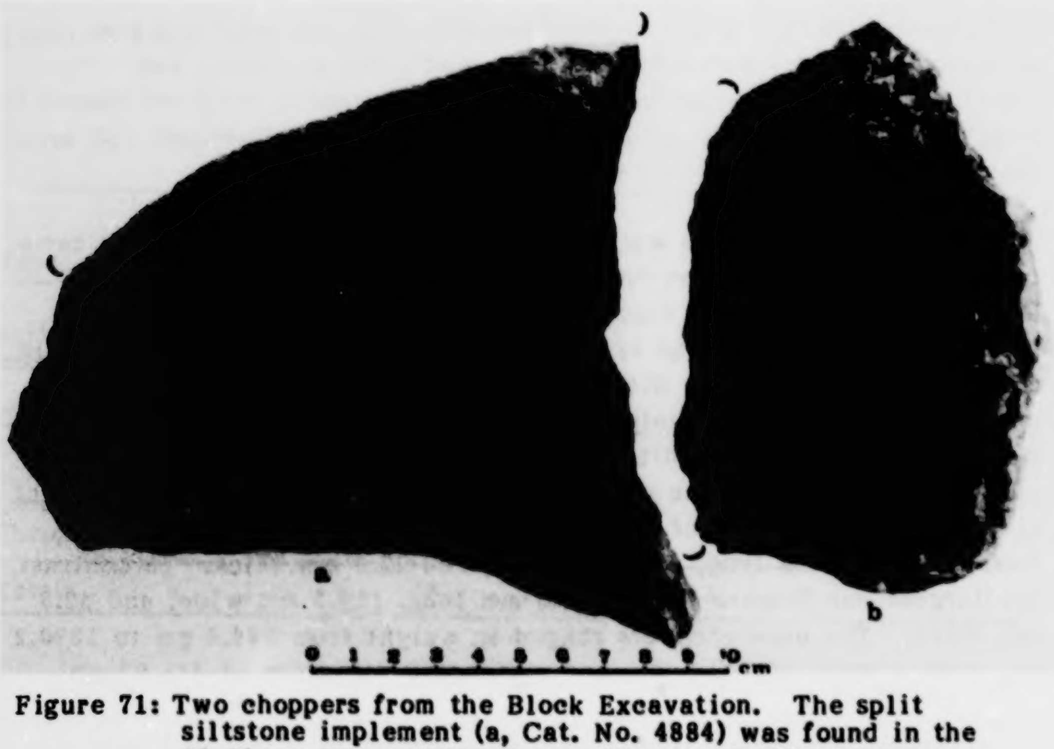


Figure 71: Two choppers from the Block Excavation. The split siltstone implement (a, Cat. No. 4884) was found in the 25-30 cm layer while the smaller crystalline siltstone tool (b, Cat. No. 4849) was recovered from the 40-45 cm layer. Brackets indicate the extent of retouch or use.

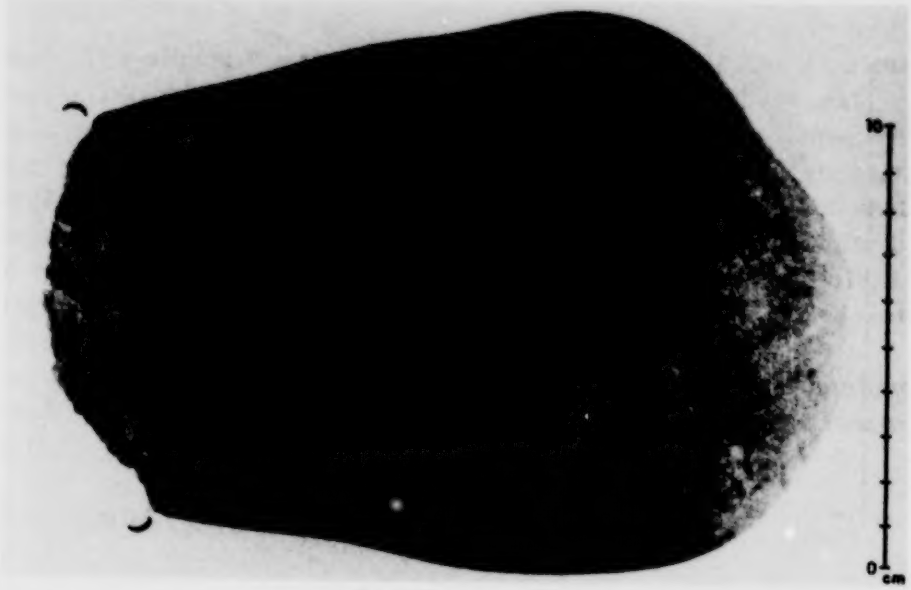


Figure 72: Massive, bifacially flaked, cobble chopper, Cat. No. 3685, recovered from the 40-45 cm level in the southeast quadrant of unit 14N 42W in the Block Excavation.

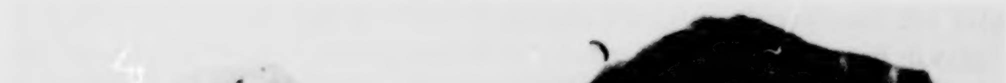


Figure 73: Two core chopppers, Cat. Nos. 7193 (a) and 5367 (b), from the Block Excavation. The smaller grey quartzite example came from the 40-45 cm level while the larger example, also of quartzite, was recovered from the 35-40 cm level.

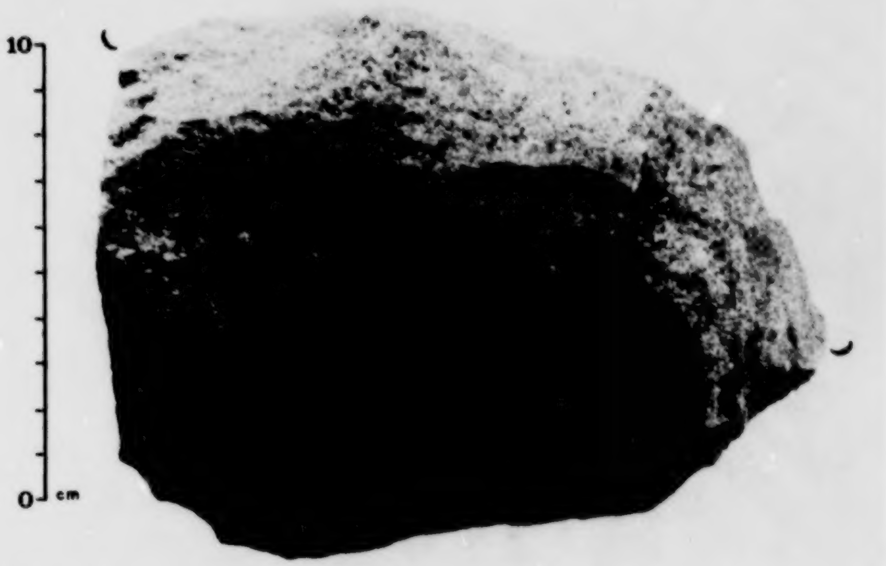


Figure 74: A massive quartzite chopper, Cat. No. 5111, recovered from the 35-40 cm level in the Block Excavation in unit NW 15N 38W.

Figure 75: A coarse siltstone abrader, Cat. No. 7855, recovered from the northwest quadrant of 17N 34W in the Block Excavation at a depth of 20-25 cm below surface.

cm zone. The reason for this is unclear, but it may reflect a cultural pattern, an intensity of occupation, or a concentration of several components within a thin layer of deposits. As mentioned above, there is a tremendous range in the weight of the cobble and core choppers. The smaller ones may easily have functioned as hand held tools while the larger, heavier ones could conceivably have been imbedded in the ground with the sharp edge pointed upward. The item that required severing could have been laid upon the worked edge and pounded with a stone from above in much the same manner as one would employ a hammer and an angle iron to cut a piece of metal. Such a technique may have caused some of the extensive battering displayed by these artifacts.

ANVIL STONES (N=9)

These are large rocks which are essentially unmodified except for the battering seen along some edges, or pitting evidenced on some of the flat surfaces. This sort of modification is an indication that these artifacts were used as anvil stones, although any of them could well have been employed for other purposes such as hammerstones, potential cores, anchor stones, and so on. Their distribution throughout the site is given in Table 21. Numerous other stones were encountered during the excavations and their occurrence was recorded even though they did not display signs of use. However, their very presence in the matrix is a clue that they had been carried to the site for whatever purpose.

Table 21: Distribution of anvil stones at site EgPr-2

Cat. No.	Provenience	Material	Weight	Use Evidence
2764 2781	14N 37W SW 10-15 14N 37W SW 20-25	grey sandstone	2149.5	edge battering
2830	14N 37W NE 20-25	quartzite	1811.0	pitting
3024	14N 38W NW 20-25	quartzite	2012.2	pitting
4725	15N 37W SE 40-45	quartzite	2404.3	battering/core
4902	15N 37W NW 40-45	grey siltstone	2027.6	edge battering
6729	16N 37W NE 40-45	grey siltstone	1726.6	edge battering
7535	16N 41W SE 40-45	siltstone	3500.0 +	edge battering
7788	17N 34W NE 40-45	quartzite	3500.0 +	pitting
7919	17N 35W SE 35-40	tan siltstone	3500.0 +	edge battering

ABRADERS (N=2)

Two tabular siltstone cobbles (Cat. Nos. 7855 and 8239) bear narrow striae on their flat aspect. The grooves are especially visible on the smaller of the two artifacts (Figure 75) and, judging by their rough, unpolished condition, appear to have been cut by a hard material. It is suggested here that these rocks were used as abraders or whetstones on which the platforms of preforms were ground smooth during the process of percussion reduction. Many of the prepared platform flakes recovered from the excavations displayed evidence of platform grinding. The smallest of these artifacts measures 129.0 mm long and 118.0 mm wide, and has a thickness of 63.5 mm. It was discovered in the northwest quadrant of 17N 34W at a depth of 20-25 cm. The larger abrader has a length of 212.0 mm, a width of 161.0 mm, and a thickness of 63.2 mm. It came from the 40-45 cm layer in the northeast quadrant of 17N 37W.

HAMMERSTONES (N=43)

Forty-three hammerstones were collected from the Sibbald Creek site. Twenty-five of them comprised quartzite cobbles, the remainder were of grey to tan compact siltstones. The hammerstones occurred in all levels of the site. They were undoubtedly implements necessary in the primary reduction phase of tool production and for crushing bone during the preparation of bone grease. All of the hammerstones were represented by waterworn cobbles that were obtained, perhaps, from the surface of the south-facing slope of Sibbald Creek valley within a few meters of the site. Modification of the cobbles through use ranged from slight pitting to marked battering and even to the removal of an occasional flake.

There is a considerable range in the weight of the hammerstones. One battered pebble (Cat. No. 6967) has a weight of 58.7 gm while the largest example, which is of quartzite (Cat. No. 5392), weighs 2102.2 gm. The mean weight of the sample is 698.8 gm; the standard deviation is 519.0 gm.

CORES (N=171)

There were 171 cores retrieved from the excavations at EgPr-2. Of these, 148 came from the Block Excavation while the rest occurred in the outlying units. Two different types of cores were distinguished. The first was a rather massive form produced by the irregular removal of flakes from a large cobble or block. The other group comprised small pebbles or pieces of rock that had been split bipolarly using the hammer and anvil technique. The vertical distribution of both types of cores recovered from the Block Excavation is given in Table 22. In general, the massive cores tended to be concentrated in the lower part of the deposits while the majority of the bipolar cores occurred in the upper levels.

The 86 massive cores recovered from the site were sorted according to lithic material types. Twenty-eight examples (32.56%) were of various quartzites (Figure 76 a), 25 cores (29.06%) were of crystalline siltstone (Figure 76 c and d), and another 22 (25.58%) were of softer tan and brown siltstones. The very fine-grained quartzites and black banded siltstone were less frequently represented. Only six and five cores, respectively, of these two lithic types were found. The massive, or more appropriately, irregular cores ranged between 27.9 gm to more than 2600.0 gm, with a mean of 577.4 gm and a standard deviation of 566.5 gm.

Table 22: Distribution of cores from the Block Excavation

	Level									
Type	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50
Massive Cores	1	1	3	7	10	8	12	12	11	8
Bipolar Cores	10	4	15	11	9	8	6	5	5	3
Totals	11	5	18	18	29	16	18	17	16	11

The 85 cores and core fragments that bear marks of bipolar reduction reflect the fundamental nature of the hammer and anvil technique in the prehistoric lithic technology at the Sibbald Creek site. This technique was employed to split small chert pebbles as well as to reduce large siltstone pieces. It is suspected that some of the large quartzite cobbles may also have been split by this method. Twenty-six of the cores (Figures 77 a, b, c, f, g, i and m; 78 c, d and l) possess one or two wedge-shaped edges that display marked battering and, in fact, may be pièces esquillées. On the other hand, the resultant shape could be a consequence of an attempt to split these stones. Some of the cores (Figure 78 g, h and m) have been reduced by blows directed from more than one direction.

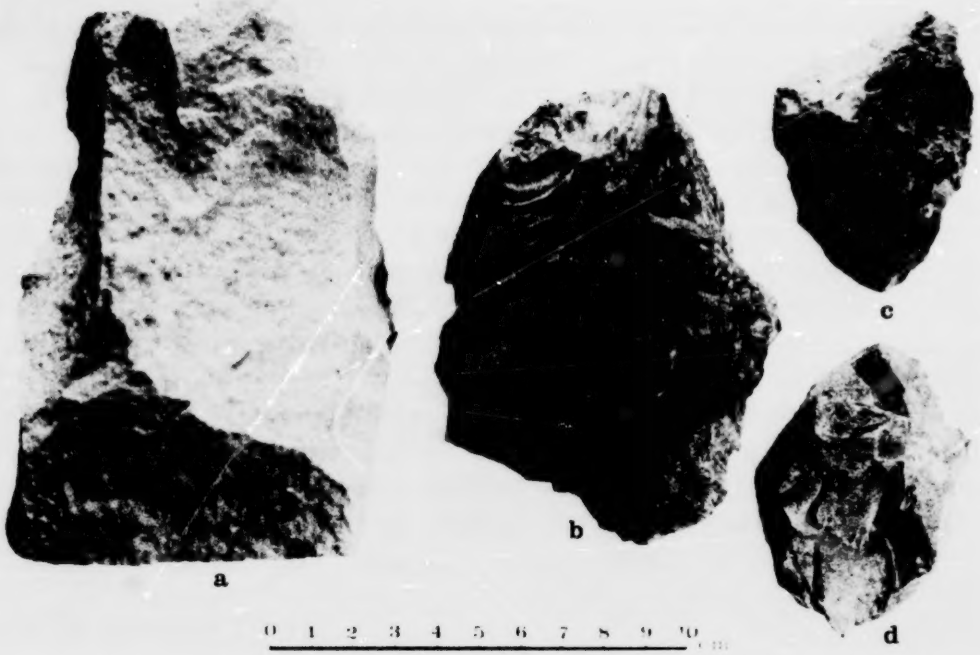

a
b
c
d
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 76: A massive quartzite core (3632), plus a large bipolar core (2915) and two small irregular cores (4510 & 4661) of crystalline siltstone, from the Block Excavation. Cores a, c and d came from the 40-45 cm zone while the other core was found in the 15-20 cm level.

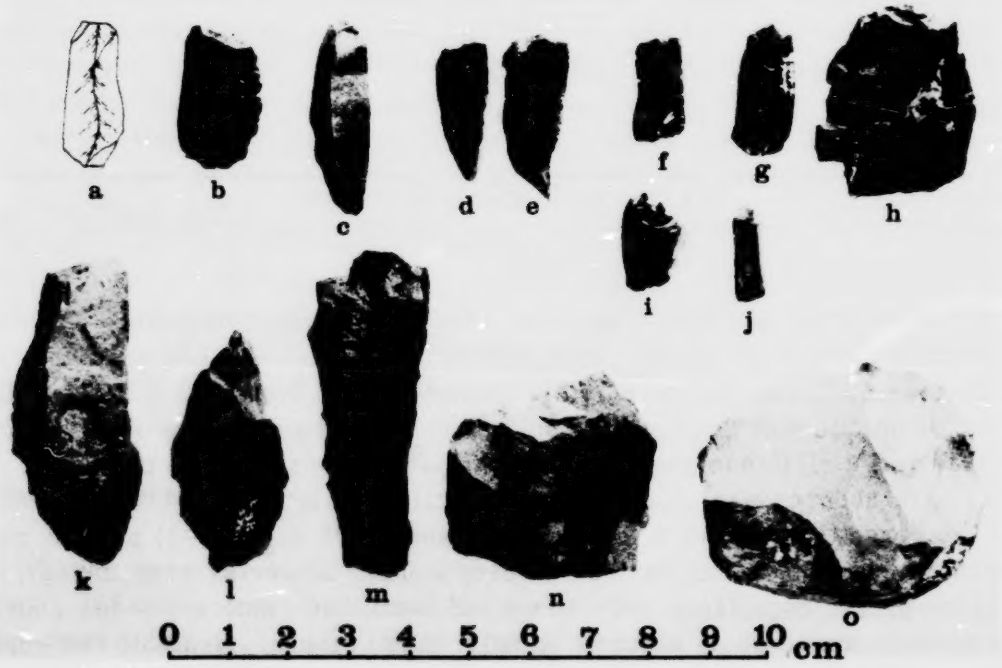

a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 77: Bipolar cores (d, e, h, j, k, l & n) and possible pièces esquillées (a, b, c, f, g, i & m) from the Block Excavation. One core (a) is of quartz, one (b) is of obsidian, three (d, e, f, h & i) are of chert, and the rest are of siltstone.

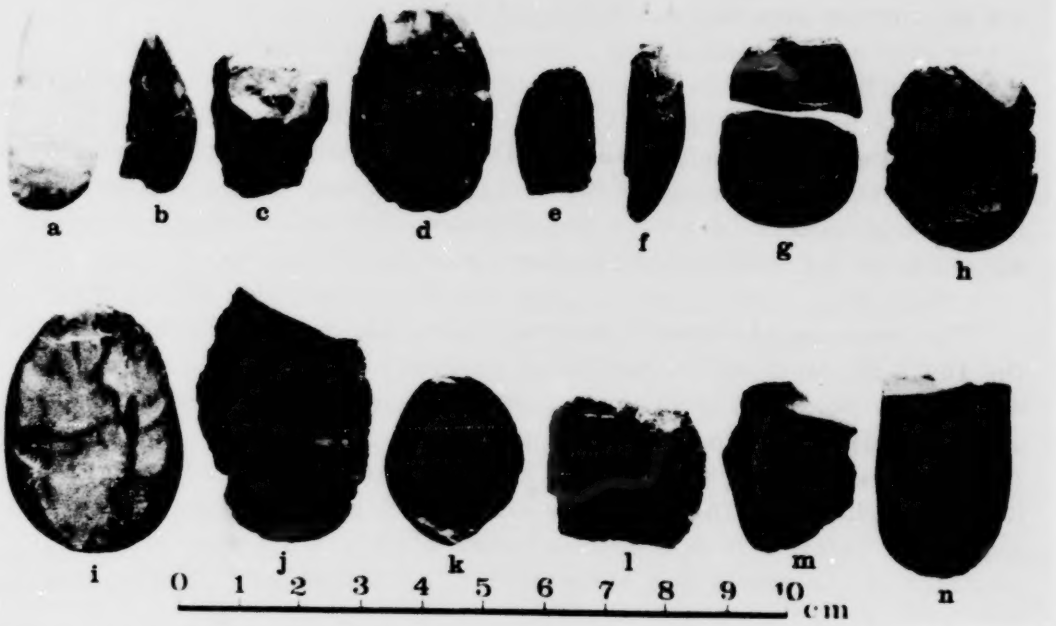

a
b
c
d
e
f
g
h
i
j
k
l
m
n
0
1
2
3
4
5
6
7
8
9
10
cm

Figure 78: A sample of some of the pebble cores (a, b, f, g, i, j, k, m & n) and *pièces esquillées* (c, d, e, h & l) recovered from outside the Block Excavation. One specimen (l) is made of fine black quartzite, another (n) is of black siltstone, and the remaining examples are of various pebble cherts.

In terms of lithic types, the greatest proportion of the bipolar cores (N=51, 60.0%) were of various cherts. There were 15 crystalline siltstone and 12 black banded siltstone cores. Two of the bipolar cores were of fine quartzite, and there was one each of obsidian, quartz and petrified wood. The remaining five were of tan and grey siltstones (Figures 77 and 78). Quantitative data was compiled only for the weight of these cores. The largest one (Figure 76 b) weighs 367.5 gm while one of the smallest pieces (Figure 77 i) weighs only 0.2 gm. The large core was excluded when the mean weight and standard deviation were calculated. Instead, the upper limit was set by the second heaviest core, one which weighs 70.4 gm. The mean weight was then 9.5 gm and the standard deviation, 14.05 gm.

NATIVE CERAMICS

Dr. Margaret Hanna, while a Doctoral candidate at the University of Calgary, graciously accepted the task of analyzing the native ceramics from the Sibbald Creek site. The following statements are derived mainly from the summary of her findings.

The ceramics included a rim fragment (Cat. No. 3800) recovered from the 10-15 cm layer in the northwest quadrant of unit 14N 42W, a neck sherd (Cat. No. 3835) from the 0-5 cm layer in the northeast quadrant of unit 14N 43W, and two small body sherds (Cat. No. 3537). The rim fragment was the largest piece of native pottery recovered at EgPr-2. It weighs 16.4 gm. The thickness along the lip varied from 7.3 to 7.7 mm, while below this it measured between 5.2 and 8.5 mm. The diameter of the vessel was calculated to be 187.08 ± 12.17 mm based on the formula used by Olinyk (1978).

Because of the small size of the sherds, statements on manufacturing procedures are necessarily tentative. The surface is impressed with a Z-twist cord beginning on the lip and extending downward. The impressions on the lip are almost totally obliterated, while those on the exterior vary from clear to partially obscured. The cord impressions may have been applied either with a cord-wrapped paddle or a cord-wrapped rod that was rolled over the surface from the lip downward. There is no visible evidence of twining, netting, or sprang techniques; the indication being that a fabric had not been used in the finishing surface.

The only decoration observed on the fragments was that on the interior angle of the lip. Two irregulary spaced impressions were made by a Z-twist cord-wrapped rod on the interior angle of the lip which caused the exterior part of the lip to protrude outward. Unidentified carbonized remains are present on the interior surface of the rim.

Thin sections were made of the neck and the larger body sherds in order to determine the nature of the paste and temper. The paste was generally fine-grained and compact. The temper consists predominantly of feldspar (plagioclase), with additional minor amounts of biotite, garnet and chlorite. A few black, opaque inclusions may be the residue of burnt iron oxide compounds. In colour, the sherds appear grey to dirty tan with very little difference evident between the outside of the vessel and the surface of the breaks.

The native ceramics were associated with a hearth area that was only partially exposed in the southwest corner of the Block Excavation. Plains Side-Notched points (Figure 21 e, f and g) and obsidian pressure flakes were also found within, or in close proximity to, the hearth area (Figures 80 to 82). The ceramics, on the basis of their apparent lack of fabric impressions, and their association with Late Prehistoric Plains Side-Notched points, are tentatively suggested to be related to the Late Variant of the Saskatchewan Basin complex which is a major ware distributed throughout southern Alberta (Byrne 1973).

PART V: THE TEMPORAL AND HORIZONTAL ASPECTS OF PREHISTORIC OCCUPATION AT EgPr-2

INTRODUCTION

In spite of the rather homogeneous character of the matrix and the compressed stratigraphy, the cultural material retrieved from the Block Excavation can be examined to determine the nature of prehistoric occupation of the Sibbald Creek site from both temporal and horizontal perspectives. In terms of the temporal dimension, the site may contain 10, or as many as 12, different cultural components. They reflect a succession of human occupation events which spans almost the entire chronological record so far established for the Northern Plains. The three radiocarbon dates from EgPr-2 provide additional support for the relative antiquity of the site which was initially suggested by the occurrence of Middle Prehistoric Period and Paleo-Indian artifacts.

The horizontal distribution of artifacts, chipping detritus, features, and so on, in the Block Excavation allows us to construct, albeit frequently incompletely and often hypothetically, activity areas and the campsite structure for a small section of the site.

THE TEMPORAL ASPECT

Three radiocarbon dates now available for the Sibbald Creek site are **5,850 ± 190 B. P.** (GX-8809), **7,645 ± 260 B. P.** (GX-8810), and **9,570 ± 320 B. P.** (GX-8808). Two brief statements on these three dates have been prepared (Ball 1983 and Gryba n. d.). The dates were run on organic particles that had been separated by fine screening from soil samples collected by Bruce Ball of the Archaeological Survey of Alberta. The samples of tiny particles, identified as wood charcoal, were processed by Geochron Laboratories Division of Krueger Enterprises, Inc. of Cambridge, Massachusetts.

The soil samples were removed from the northeast corner of the Block Excavation from the south wall of unit 18N 35W. Here, the culture-bearing deposits were 40 to 45 centimeters deep and showed signs of thinning out upslope. The sample which yielded the 5,850 ± 190 B. P. radiocarbon date was collected from the 25-30 cm layer, the one which gave the 7,645 ± 260 B. P. date comprised a combination of material screened from the 35-40 and 40-45 cm layers, while the third sample that produced the 9,570 ± 320 B. P. radiocarbon date was obtained from the 35-40 cm below surface layer.

Commenting on the 9,570 ± 320 B. P. date, the people of Geochron Laboratories (Geochron 1982) wrote that:

> an electronic counting device associated with this counter had to be replaced the next day because it did not register all actual counts. We cannot be certain that it did not start to fail during the count of this sample. If so, the reported age would be too old.

The samples were screened from matrix which appears to the naked eye to be quite homogeneous. The charcoal may have originated from prehistoric campfires, or from natural forest fires. Also, some of it could conceivably have been washed down with soil derived from the knoll that flanks the site.

Acknowledging the problems relating to the origin of the organic particles and the potential for mixing of the deposit, plus the possibility for error during the calculation of the earliest date, there is, nevertheless, fairly good agreement between the three radiocarbon dates and the evidence already provided by the vertical distribution of diagnostic cultural elements such as projectile points. Note, for instance, that the 5,850 ± 190 B. P. radiocarbon date is on a sample obtained from the 25-30 cm layer that separates the main concentrations of Oxbow and Mount Albion points (Figure 79). A date of 9,570 ± 320 B. P. does not seem unreasonable for the basal part of the site.

It is not the purpose of this monograph to produce a synthesis of Northern Plains or southwestern Alberta prehistory. Nor will it be the objective to further muddle the archaeological literature with new designations when the stratigraphic separation of the different components at EgPr-2 leaves so much to be desired. Besides, the various components manifest at the Sibbald Creek site could be assigned to already established phases or technological traditions whose temporal and geographic distributions, with few exceptions, have become fairly generally known (see, for example, Gordon 1979:52-74).

The table illustrating the vertical distribution of the various projectile point types recovered from the Block Excavation is juxtaposed alongside a slightly modified scheme prepared by Frison (1978:Figure 2:26) for the Northwestern Plains cultural chronology (Figure 79). Some readers might react negatively to this emphasis on "projectile point archaeology". But, be that as it may, the data obtained from well-stratified sites on the Northern Plains has, time and time again, demonstrated that projectile points are quite sensitive and reliable chronological and spatial cultural indicators.

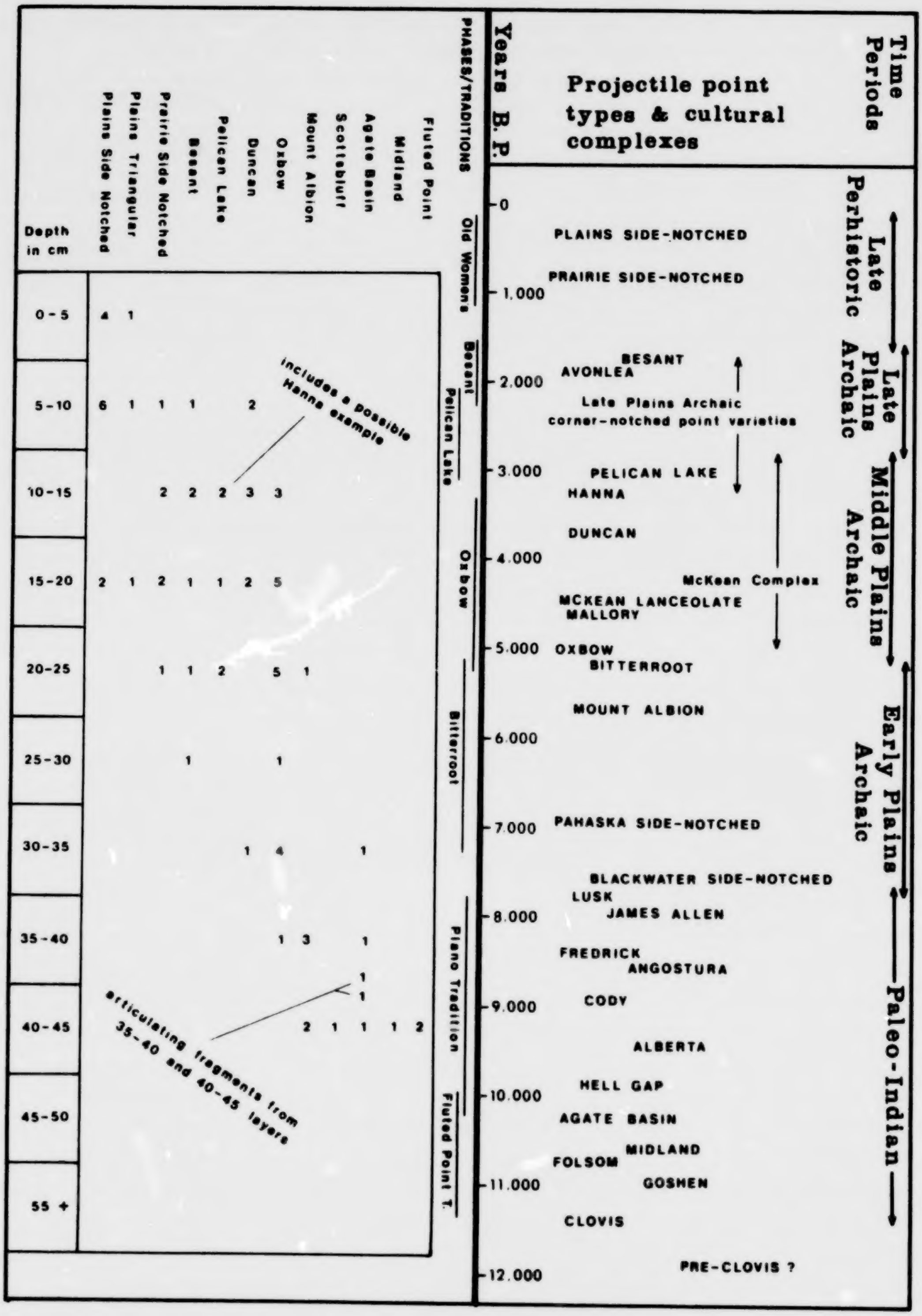


Figure 79: Distribution of point types from the Block Excavation and a chronological scheme for the Northwestern Plains.

In regard to the time periods shown in Figure 79, in Alberta, the use of the term "Paleo-Indian Period" is generally synonomous with "Early Prehistoric Period", one characterized by the large, finely crafted, un-notched spear points. Frison's "Early", "Middle" and "Late Plains Archaic" periods equate with the "Middle Prehistoric Period" and are marked by the large, notched, atlatl dart points. The Late Prehistoric Period is distinguished by the presence of arrow points and ceramics.

In southwestern Alberta the cultural sequence for the Late Prehistoric Period and the last half of the Middle Prehistoric Period has received extensive coverage as a result of the excavation of bison drives and stratified campsites (Forbis 1962; Reeves 1966 and 1970; and Driver 1978). Consequently, the temporal positions of many of the later phases, such as Old Women's, Avonlea, Pelican Lake, McKean and Oxbow, have been well established through radiocarbon dates obtained from many sites throughout the Northern Plains (Figure 79).

By comparison, our knowledge of the early part of the Middle Prehistoric Period remains quite sketchy, although Bitterroot artifacts have been recovered from well-dated contexts in southern Alberta. At the Gap site (DlPo-20) located just inside the Front Range along the Oldman River, two components separated from one another by a layer of Mazama ash, were dated at 6,060 ± 140 B. P. (GSC-1255) and 6,720 ± 140 B. P. (GSC-1298), respectively (Reeves and Dormaar 1972:333). At the Stampede site (DjOn-26) situated in the Cypress Hills is southeastern Alberta, charred bone obtained from a hearth associated with side-notched, square- to convex-based points yielded a date of 7,245 ± 255 B. P. (NMC-571) (Gryba 1976b:93). The Boss Hill site, located northeast of Red Deer, contained a mixed assemblage of corner-notched and lanceolate points beneath a layer of Mazama ash. Dates of 7,875 ± 130 B. P. and 7,750 ± 195 B. P. were obtained for the culture-bearing stratum (Maurice Doll 1981, personal communication).

When we deal with the Paleo-Indian Period, the picture is even more dismal. Convincing radiocarbon dates for any of the Paleo-Indian complexes which are now known from surface finds and from poorly stratified contexts in southern Alberta, have yet to be realized. Humbolt concave and stemmed points, Agate Basin, Pryor Stemmed, Lovell Constricted, Lusk and Cascade points occur in the Crowsnest Pass area where a number of components have been excavated (Driver 1978:97-98). However, the radiocarbon dates obtained in this area thus far, have been on components that have produced either no diagnostic artifacts, or else have been at great variance with the currently accepted dates. At the Gap site referred to above, organic material associated with a living floor situated beneath the Bitterroot components produced dates of 9,520 ± 240 B. P. (GX-0956) and 8,000 ± 150 B. P. (GSC-1158). An Agate Basin point was discovered on the surface of the site (Reeves and Dormaar 1972:333). The more recent of these two dates matches closely those obtained on the Agate Basin and corner-notched point assemblage from the Boss Hill site. These dates are somewhat younger than those obtained on Agate Basin components at the Agate Basin and Brewster sites in Wyoming. A date of 10,430 ± 570 B. P. (RL-557) is available for the former site, while two radiocarbon dates, 9,990 ± 225 B. P. (M-1131) and 9,350 ± 450 B. P. (O-1252), are given for the latter (Frison 1978:Table 2.2).

Four radiocarbon dates have been obtained from the Fletcher site (Quigg 1976:108). One particular date of 7,655 ± 110 B. P. (S-1084) may relate to the Cody complex occupation. However, like the Agate Basin dates from the Gap site it, too, is younger than those currently available on comparable components from sites on the Central Plains. For example, two dates from the Horner site read 8,750 ± 120 B. P. (UCLA-697A) and 8,840 ± 120 B. P. (697B), while dates on the Cody component at the Finley site are 8,950 ± 220 B. P. (RL-574) and 9,026 ± 118 B. P. (SMU-250) (Frison 1978:Table 2.2). The somewhat earlier radiocarbon dates on an Alberta complex component at the Hudson-Meng site in Nebraska (8,990 ± 190 B. P. (SMU-52), 9,380 ± 100 B. P. (SMU-102), and 9,820 ± 160 B. P. (SMU-224)) suggest that this culture complex may be the forerunner of Scottsbluff/Eden.

In dating the Fluted Point Tradition material at the Sibbald Creek site it is necessary to rely upon information obtained from sites that lie outside Alberta. Nevertheless, these dates do give an idea of when this tradition may have been in vogue in this part of the continent. The Folsom component at Brewster, Wyoming yielded a date of 10,375 ± 700 B. P. (I-472), while at the Hanson site in Wyoming, a Folsom component gave dates of 10,700 ± 670 B. P. (RL-374) and 10,080 ± 330 B. P. (RL-558). The date on the Folsom level at Lindenmeier, Colorado, is 10,850 ± 550 B. P. (I-141) (Frison 1978:Table 2.1). In eastern Idaho, west of the continental divide, three radiocarbon dates obtained on proboscidean remains associated with Folsom artifacts at the Wasden site are available. They are 12,250 ± 200 B. P. (WSU-1259), 12,800 ± 150 B. P. (WSU-1281), and 10,920 ± 150 B. P. (WSU-1786) (Miller and Dort 1978:131). The last of these three dates is within close range of those obtained elsewhere on Folsom.

The dates on Clovis are somewhat earlier: 11,200 ± 500 B. P. (I-622) at Dent, Colorado and 11,200 ± 220 B. P. (RL-392) and 10,548 ± 141 B. P. (SMU-254) for the Colby site in Wyoming (Frison 1978:Table 2.1). Two of the dates from the Domebo site in southwestern Oklahoma (11,220 ± 500 B. P. (SI-172), and 11,200 ± 600 B. P. (SI-175)) are in close agreement with the above dates and with those obtained from the Lehner site and Blackwater Draw (Leonhardy and Anderson 1966:25).

In eastern North America, the Debert site in Nova Scotia produced thirteen acceptable dates which averaged 10,600 ± 47 B. P. (MacDonald 1968:53). At the one sigma level they gave a time span ranging from 10,338 to 11,251 B. P. Because of the homogeneity of the artifacts from the different occupation areas, MacDonald feels that the period of habitation was much less than the 207 year (10,594 to 10,801 B. P.) minimum span indicated by the radiocarbon dates. Artifacts quite similar to those found at Debert have recently been reported from the Vail site 600 kilometers to the west in western Maine (Gramly and Rutledge 1981). The two dates now available for this site are 10,300 ± 90 B. P. (SI-4617) and 11,120 ± 180 B. P. (Beta-1833). Gramly (ibid.:360) feels that because of the more thorough extraction of humic acids, the earlier date is the better approximation of the antiquity of the Vail site.

The above data seem to suggest that the widespread Fluted Point Tradition was restricted to a rather brief 1,000 year time span which commenced around 11,200 years ago. There is little reason why the fluted points from the Sibbald Creek site should not date to this period. Both of the fluted points from EgPr-2, while formally different from each other, share the characteristics of overall pressure flaking and multiple fluting, an indication that they were either manufactured by the same person or by people who were closely related culturally. If the Midland point is also part of the same component, then one might go so far as to suggest a Folsom connection for the fluted point material from the Sibbald Creek site. The similarity of some of the side scrapers recovered from the lower levels of EgPr-2 to the large, edge-retouched tools found at the Hanson site was noted earlier in this report. On the other hand, it is more conceivable that EgPr-2 could have been occupied on a seasonal basis by different bands of hunters and that the two fluted points and the Midland example were each left behind by hunters from culturally discrete groups. The broken fluted point from EgPr-2 has a broad, V-shaped base which does resemble the Clovis style. When one becomes cognizant of the fact that the lower 10 centimeters of the deposits in the Block Excavation yielded Mount Albion, Scottsbluff, and Agate Basin points in addition to the Midland

and the fluted examples, artifacts which may represent some 5,000 years of site use, the problem of isolating components relating to separate episodes of occupation becomes that much more difficult.

Surface recoveries of fluted points are known for the southern half of Alberta to as far north as the Peace River district. Some of these occurrences have been reported by Wormington and Forbis (1965), while most are on record at the Provincial Museum in Edmonton. It is expected that a short statement describing these finds will be prepared by the senior writer in collaboration with Maurice Doll and submitted for publication in the near future. The surface occurrences of fluted points are reported from the Plains, Foothills and even the mountains of southern Alberta. Site EhPu-1, in particular, warrants mention. Situated on the shore of Lake Minnewanka, this unstratified site has yielded a mixed assemblage of projectile points and other diagnostic artifacts which reflect occupation of the area dating from Paleo-Indian time to the Late Prehistoric Period (McIntyre and Reeves 1975). This lake lies within the Rocky Mountain Front Range roughly 45 kilometers northwest of the Sibbald Creek site. The Parks Canada collection at Calgary contains one basally thinned and three fluted points from this site (Christensen 1971:Figure 5; McIntyre and Reeves:Plate 9). The points display overall pressure flaking. Fluting was accomplished by the removal of either single or multiple flakes from one or both faces. One point has a broad, V-shaped base; another example has a deeper, U-shaped base. On the other two examples the base is only slightly concave. If these points are variants of the Clovis type, the implication is that the mountain valleys were attractive for occupation at a fairly early time. It may well reflect the fact that the natural environment all along the southern section of the eastern slopes of the Rocky Mountains in Alberta was actually quite suitable for human occupation during the time that the use of fluted points was in vogue on the Northern Plains.

THE HORIZONTAL ASPECT

Introduction

At the Sibbald Creek site, topographic features narrowed the choice of a good campsite location to a small protected enclave nestled against the south side of a high knoll. Here, on a piece of terrain measuring no more than approximately 600 square meters, successive groups of hunters established their temporary settlements upon the debris of those who had preceded them. Apparently, few had ventured to set up their camps away from the protection of the hill, for beyond the sheltered enclave, the abundance of cultural debris drops off dramatically. The size, organization and the number of social units, success of the hunt, time of year, duration of stay, local topography, nature of the vegetation cover, climate, plus other variables, determined the arrangement of the campsite and the nature of the refuse.

The results of the faunal analysis (Appendix II) tentatively suggest that, at least during the Late Prehistoric Period, the favoured season of occupation was autumn or early winter. This may have been the pattern of site use for much of the prehistoric period. By analogy to ethnographic sources, we can infer that a diversity of activities was carried out at EgPr-2, and that it included those general ones which were necessary for maintaining the economic, social, and ideological aspects of each band of hunters that occupied the site.

Slope derived material and wind borne dust served to bury the campsite debris. Based on the depth of the cultural deposits it is estimated that the average rate of sediment accumulation within the Block Excavation was in the order of about one centimeter for every 250 years. However, the compression of the Paleo-Indian and Mount Albion artifacts into a 10 centimeter layer suggests that there were occasions when the buildup of deposits proceeded at a much slower rate. Some cultural remains probably lay strewn on the surface for many years before they were finally covered over. Certainly, many discarded items perished through the processes of natural decay, while vegetation soon obscured traces of workshop areas and where dwellings and other structures once stood. In the upper few layers some bone that had escaped decay remained sufficiently preserved to suggest what animal species had been hunted while in the lower layers only small calcined fragments of bone were found. Even the durable elements that had escaped destruction were not free from impact for there was always the potential of disturbance from physical and biological agents. These, then, are the types of factors that one must be cognizant of when it comes to interpreting the horizontal and vertical distributions of the archaeological remains from the Sibbald Creek site.

The excavations at EgPr-2 were, unfortunately, of a salvage nature, with the matrix from each square meter unit removed in five centimeter layers and sifted through screens fine enough to recover the small pressure flakes. Still, when the horizontal distribution of artifacts and data recovered in the excavations was plotted, areas of prehistoric activities could be discerned. The most conspicuous of these were the tool manufacturing stations and the hearth areas. Other activity areas are inferred from the distribution of faunal remains, and by the associations of specific artifact or tool categories.

Distribution maps of artifacts and features for the different levels of the Block Excavation are presented in Figures 80 to 88. The interpretation of the distribution of the faunal material from the upper levels is covered in Appendix II and, therefore, will receive only general treatment here. The maps must be regarded primarily as being visual representations of the cultural material and features recorded from the excavations. There may, or may not, be contemporaneity of the various features, or cultural homogeneity of the material remains, recorded for each level. The occurrence of different projectile point styles together in many of the layers is a reflection that a mixed association is the more frequent condition. Furthermore, vertical dispersion of flakes of very distinctive lithic materials and refitted tool fragments provide indisputable confirmation that some mixing of the deposits had occurred. Some of the workshops and hearths extend vertically through several layers, and this data may prove useful in arranging them in some relative chronological order. Also, it must be remembered that in the vicinity of the 12N line the deposits were more compressed than they were throughout the rest of the Block Excavation. Here, seldom was any cultural material encountered below a depth of 35 centimeters beneath the surface. This is evident by the lack of representation of campsite refuse for this area in Figures 86, 87 and 88. From the positive perspective, one of the more useful applications of the distribution diagrams would be in aiding future investigators in selecting areas for possible excavations.

The position of the Block Excavation in relation to the rest of the excavations at the Sibbald Creek site is illustrated in Figure 10. This figure also shows the horizontal grid system that was imposed upon the site. Each two by two meter square excavation unit was identified to a specific north and west reading by its southeast corner. The units were further subdivided into four, meter-square quadrants. Diagrams showing the occurrences of discarded tools and major concentrations of lithic debitage, burnt bone fragments and fire broken rock were initially prepared only for the portion of the Block Excavation located north of the 13N line where the deposits were of more or less uniform depth. The coverage was later extended to include the comparatively shallower units excavated along the 12N and 13N lines, since it was felt that the information from this area, albeit less reliable, might serve to support or enhance patterns of artifact distributions observed for the rest of the Block Excavation.

One point that should be noted is that the diagrams do not illustrate the occurrence of all debitage, fire broken rock and burnt bone fragments, but merely significant clusterings since the main purpose was to demonstrate the location of major activity areas.

Because the arbitrarily defined five centimeter layers do not represent temporally or culturally distinct components, the cultural remains represented in each diagram could not be treated in isolation. It was, therefore, necessary to make frequent reference to the cultural remains observed in the layers immediately below or above. The distribution diagrams are covered below in 10 centimeter increments mainly as a matter of convenience.

0-5 cm and 5-10 cm layers

The most prominent features which appear in the two upper levels are the two hearths, one situated roughly in the middle of the Block Excavation and the other just partially exposed along the western border (Figures 80 and 81). Plains Side-Notched points as well as faunal remains were discovered in close proximity and inside both hearths. In addition, obsidian pressure flakes and native ceramics came from the vicinity of the western hearth.

A major concentration of unburnt faunal remains occurred in close proximity to each hearth. The identifiable bone in these concentrations consisted overwhelmingly of bison remains while bones of other species were sparsely distributed over the Block Excavation. The faunal analysis suggests that only the non-bison remains display convincing evidence of having been butchered by metal tools. Historic period artifacts that may date to the latter half of the last century also occurred peripheral to the two concentrations of bison remains.

Lithic workshops emerge in the 0-5 cm layer, and are more obvious in the 5-10 cm layer. A scattering of pressure and prepared platform percussion flakes of a mottled wine chert or chalcedony was found, along with several broken points and biface fragments of this same material (Figure 31 b, c and d), in the vicinity of a concentration of burnt bone fragments in the southeastern corner of the Block Excavation. Two Besant points, one of which had been reworked into an end scraper (Figure 57, Type 8), came from this hearth area. This workshop station was most obvious in the 5-10 cm and 10-15 cm layers.

Scatterings of crystalline siltstone and black banded siltstone showed up in the first level but were more obvious in the 5-10 cm layer. There may be an association of chert, chalcedony and black banded siltstone flakes and burnt bone scraps in the 5-10 cm and 10-15 cm layers along the eastern side of the excavations.

Retouched flakes are relatively numerous in the 5-10 cm level, being especially concentrated in the central and eastern sections of the Block Excavation. The concentration of these artifacts in the central part manifests itself in several lower levels. Plains Side-Notched, Besant and Duncan points in the 5-10 cm level are ample evidence that the retouched flakes and other general tool forms and features are derived from a number of occupational episodes.

In the western part of the Block Excavation the open areas which contain few artifacts and little burnt bone may mark the places where dwellings were situated.

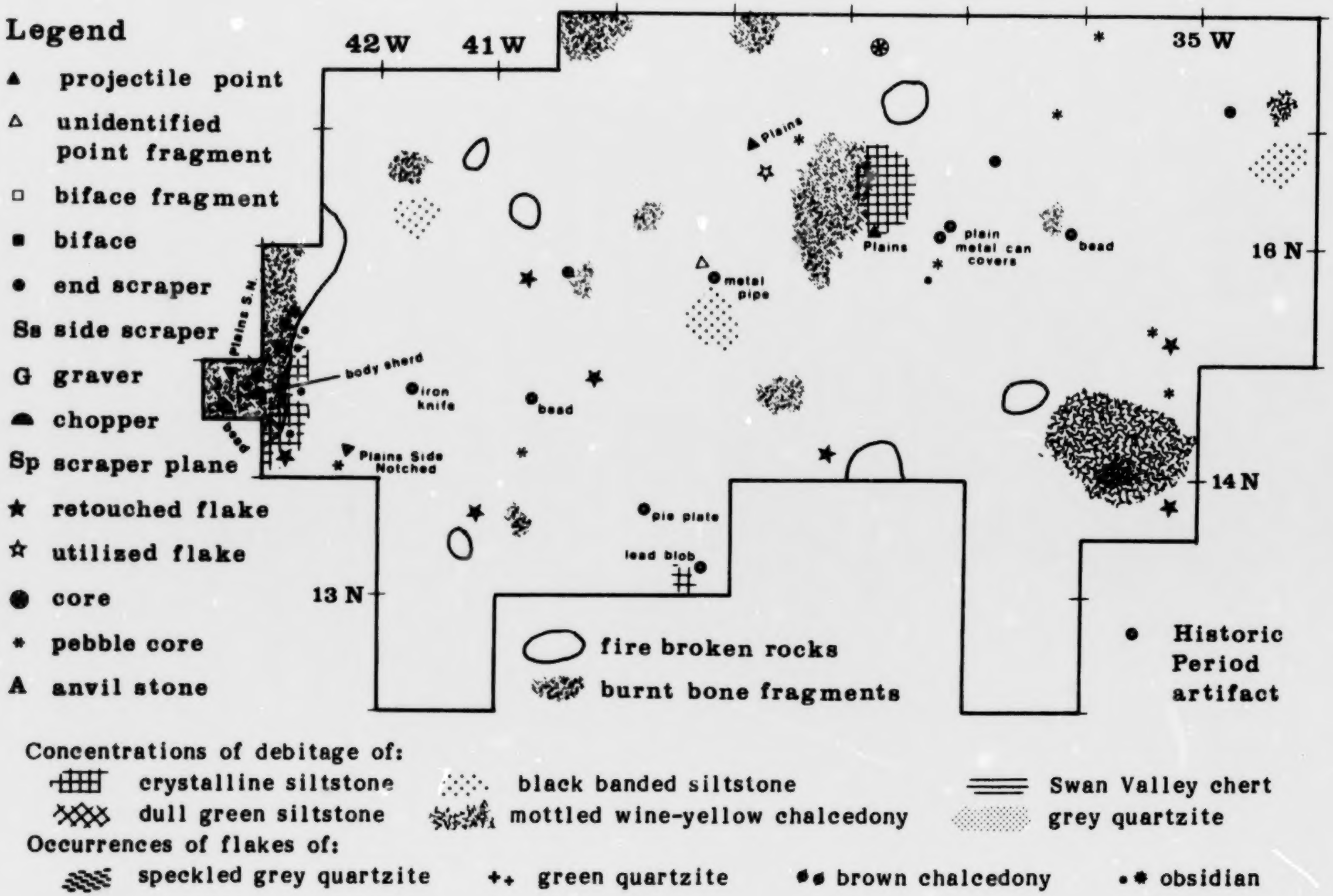

Legend
▲ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
core
* pebble core
A anvil stone
42 W
41 W
35 W
16 N
14 N
13 N
Plains
Plains
plain metal can covers
bead
metal pipe
Plains S.N.
body sherd
iron knife
bead
bead
Plains Side Notched
pie plate
lead blob
fire broken rocks
burnt bone fragments
Historic Period artifact
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
green quartzite
brown chalcedony
obsidian

Figure 80: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 0-5 cm below surface level.

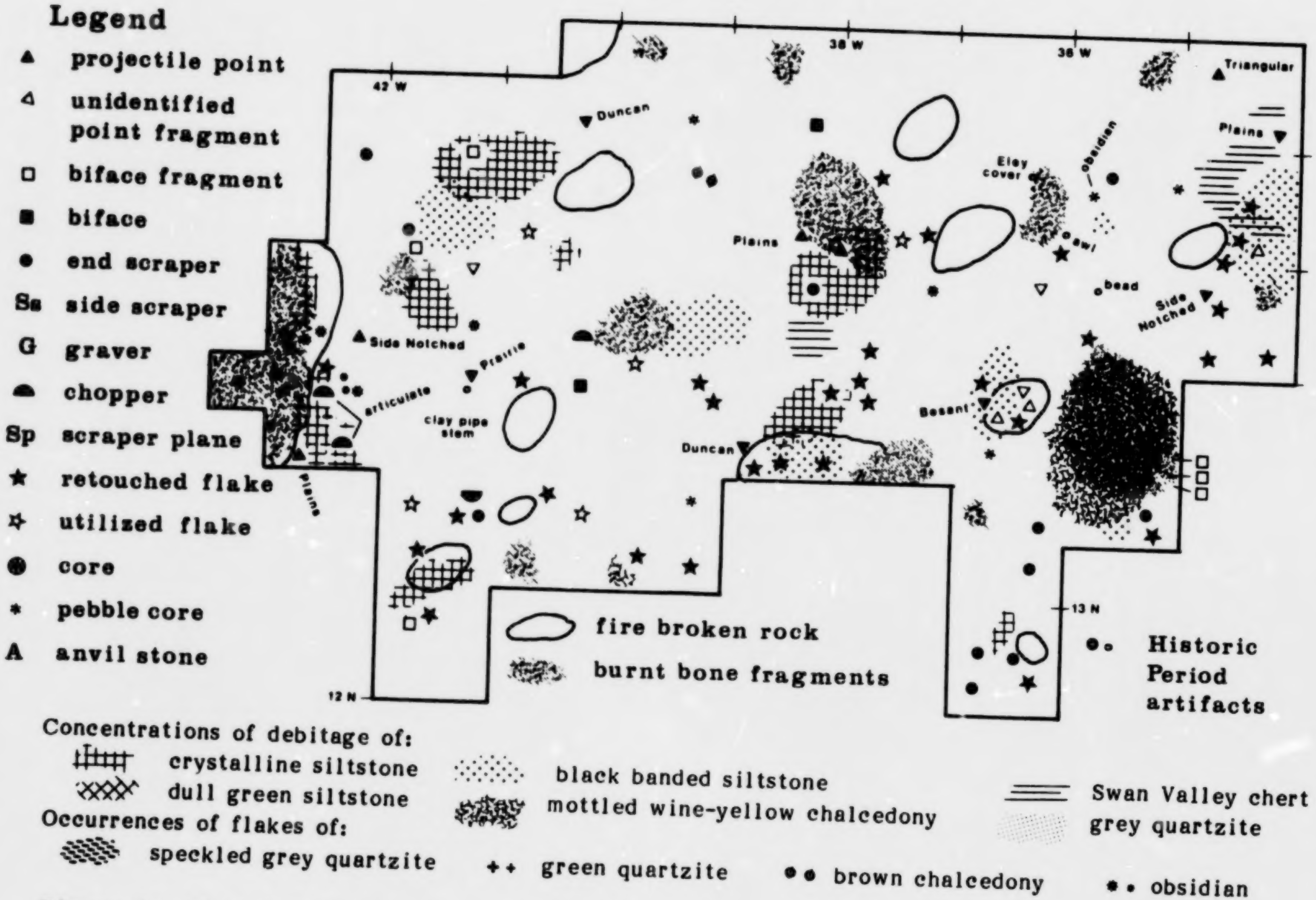

Legend
▲ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
◓ chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
⊛ core
* pebble core
A anvil stone
42 W
38 W
36 W
12 N
13 N
Triangular
Plains
Duncan
Side Notched
Prairie
articulate
clay pipe stem
Elay cover
obsidian
awl
bead
Besant
fire broken rock
burnt bone fragments
Historic Period artifacts
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
++ green quartzite
●● brown chalcedony
** obsidian

Figure 81: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 5-10 cm below surface level.

10-15 cm and 15-20 cm layers

The amount of cultural refuse increases in the 10-15 cm layer (Figure 82). The chert and chalcedony workshops in the eastern part of the Block Excavation, which probably date to the Besant or later phases of site use, all but disappear in the 15-20 cm level. The workshop stations, where artifacts of black banded and crystalline siltstone were roughed out, are even more conspicuous now than they were in the higher levels. A scattering of quartzite flakes emerges in the southwest corner of the Block Excavation.

Flakes of speckled grey and green quartzites start showing up in the 10-15 cm and 15-20 cm layers in the northeastern section of the Block Excavation. Flakes of these two very distinctive quartzites were evidently detached from two small cobbles and were dispersed vertically throughout the deposits within a relatively restricted horizontal extent to a depth of 35-40 cm. Flakes of the speckled grey quartzite were concentrated in the west half of unit 16N 36W, while the ear portion of a possible Oxbow point of this unmistakable lithic material, came from the 15-20 cm layer in the northwest quadrant of this unit.

One ceramic sherd as well as projectile points spanning the temporal range from Oxbow to the Late Prehistoric Period, were recovered from these two layers. Besant, Duncan and Oxbow points occurred most frequently. On this basis it is suggested that much of the refuse encountered in the 10-20 cm zone was left by the makers of these point types. The large fireplace which is centered around the northeast quadrant of unit 16N 40W may relate to the Oxbow occupation of the Sibbald Creek site, for a burnt point (Figure 27 m) was discovered near the bottom of this hearth. This feature is quite obvious in Figures 83 and 84.

The concentration of retouched flakes noted earlier for the central part of the Block Excavation in the 5-10 cm layer and the occurrence of end scrapers in the vicinity, are manifest in the 10-15 cm, 15-20 cm and 20-25 cm layers (Figures 81-84). It is speculated that this was an area where hides were processed and, perhaps, clothing prepared. No microscopic edge wear analyses were carried out on these or other stone tools that were recovered from the excavations to support this speculation. The apparent coincident occurrence of edge-retouched tools and bipolar cores in this part of the site (Figure 82) escapes explanation, even if some of the latter artifacts are, in fact, _pièces esquillées_.

There were several instances where conjoining tool fragments were recovered, separated vertically and horizontally from each other. Note, for example, the vertical dispersion of the fragments of two reassembled end scrapers indicated in Figure 82. One of the examples appears to connect two small activity areas where work involving end scrapers was performed.

A few open areas, dominated mainly by small concentrations of fire broken rock without any appreciable amounts of burnt bone, tools or lithic detritus, are also obvious in the 10-15 cm and 15-20 cm layers, as well as in the lower layers. If the production of stone tools and weapons, the butchering and processing of carcasses, and the preparation of hides, bone grease and clothing, and the performance of other economic activities was carried on outdoors in daylight conditions, then it is likely that the primary function of these isolated hearths was to provide heat and they may, therefore, represent dwelling locations.

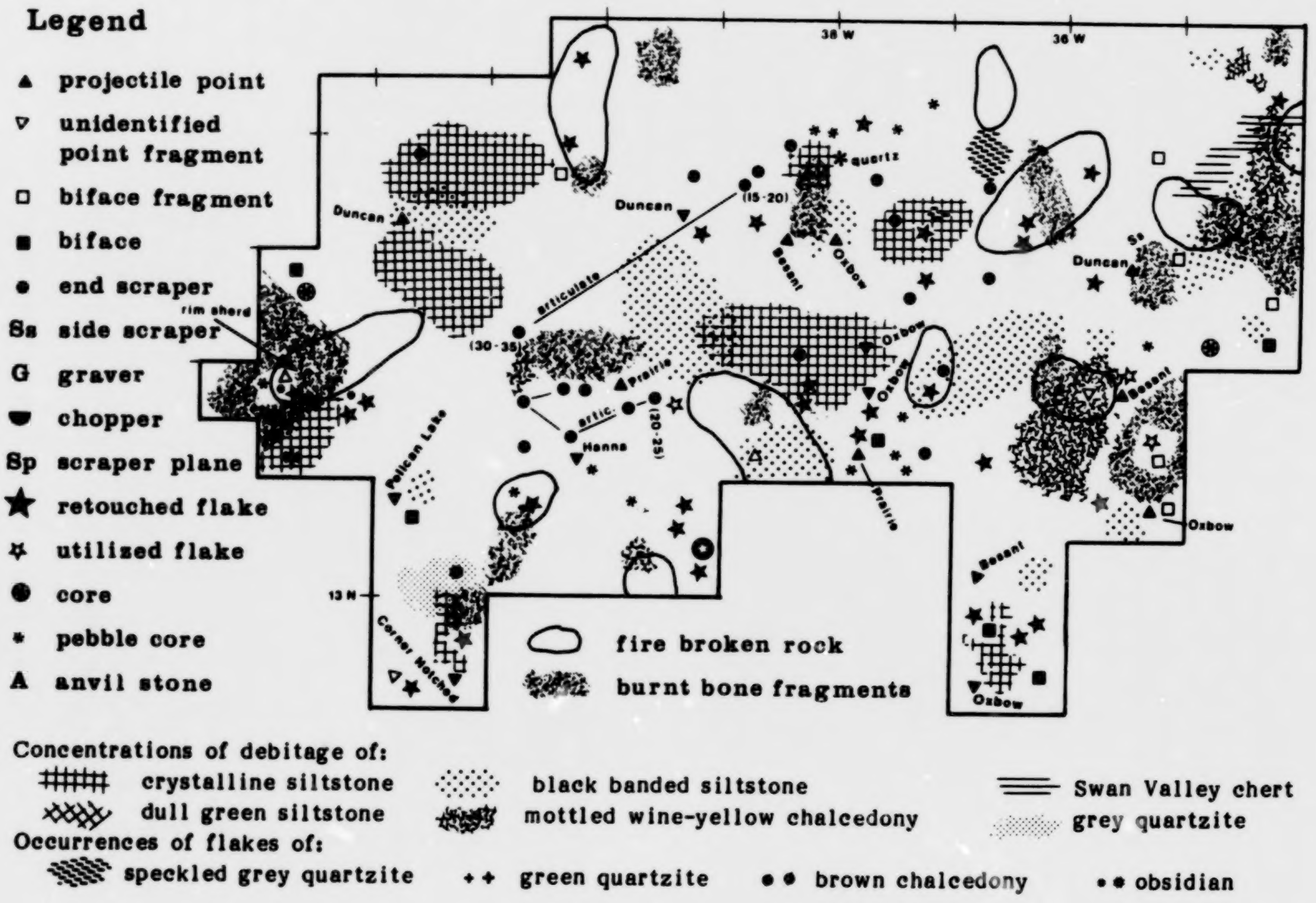

Legend
▲ projectile point
▽ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
core
* pebble core
A anvil stone
fire broken rock
burnt bone fragments
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
green quartzite
brown chalcedony
obsidian
38 W
36 W
13 N
Duncan
Besant
Oxbow
Prairie
Pelican Lake
Corner Notched
Hanna
articulate
artic.
quartz
rim sherd
(15-20)
(20-25)
(30-35)
Ss

Figure 82: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 10-15 cm below surface level.

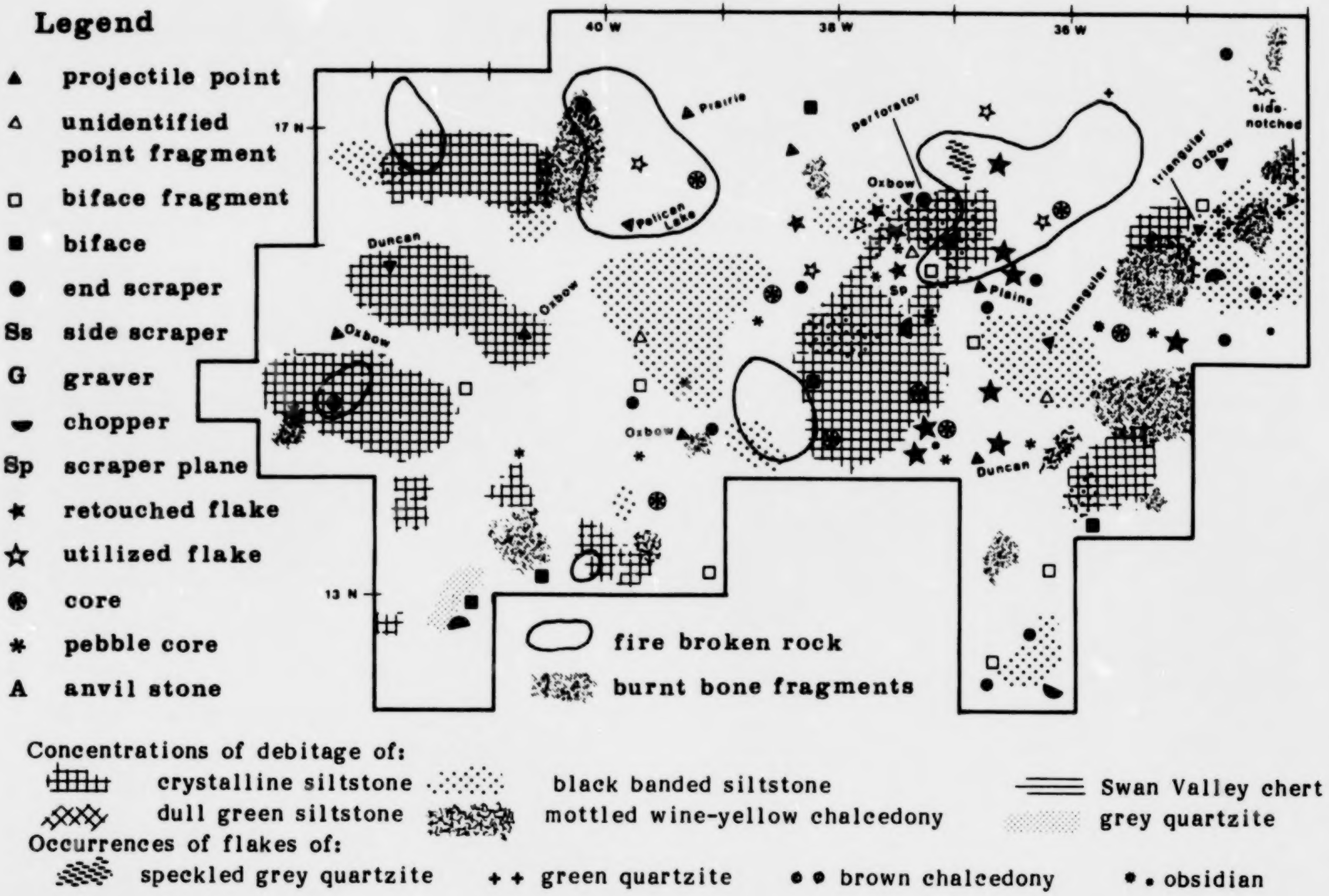

Legend
▲ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
retouched flake
☆ utilized flake
core
* pebble core
A anvil stone
fire broken rock
burnt bone fragments
Concentrations of debitage of:
crystalline siltstone
black banded siltstone
Swan Valley chert
dull green siltstone
mottled wine-yellow chalcedony
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
+ + green quartzite
● • brown chalcedony
* • obsidian
40 W
38 W
36 W
17 N
13 N
Prairie
Pelican Lake
Duncan
Oxbow
Oxbow
Oxbow
perforator
Oxbow
Sp
Plains
Duncan
triangular
triangular
Oxbow
side-notched

Figure 83: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 15-20 cm below surface level.

20-25 cm and 25-30 cm layers

One of the most striking aspects of the distribution diagram for the 20-25 cm layer (Figure 84), is the visible occurrence of tools, particularly the larger choppers, side scrapers and scraper planes, often in areas abundant in lithic waste and burnt bone fragments. Much of the refuse might be attributable to the Oxbow occupations, but the presence of other point types and two gravers is an indication that cultural material from earlier and later components is also included in the 20-30 cm zone (Figures 84 and 85).

The occurrence of conjoining sections of three broken tools is illustrated in Figure 84. Portions of the same end scraper were recovered from the 5-10 cm, 10-15 cm and 20-25 cm layers. The hafted biface reassembled from three sections plotted in Figure 84 is shown in Figure 35 a.

The large concentrations of crystalline siltstone and black banded siltstone present in the central and western part of the Block Excavation in the 20-25 cm layer may relate to Oxbow use of the site. The extensive concentration of debitage of black banded siltstone and crystalline siltstone evident along the eastern edge of the Block Excavation extends down for several levels, and may represent a Paleo-Indian activity area. A small quantity of obsidian pressure flakes was discovered in the 25-30 cm layer in the north half of 14N 35W. Additional obsidian flakes were recovered here from the 30-40 cm zone.

In Figure 85 there is a marked decrease in cultural refuse compared to that evident in the Block Excavation in the immediately higher levels. The 30-35 cm layer contained more cultural remains than did the 25-30 cm layer. Stratigraphically, this zone, at least in the central section of the Block Excavation, is roughly believed to mark the end of the Altithermal Period and the initial occupation of the site by the Oxbow hunters.

The absence of cultural remains in 12N 36W in the 25-30 cm layer reflects the shallow nature of the culture-bearing deposits in this part of the site. Considerable mixing of the deposits was evident here and interpretations would be even less reliable than those suggested for the deeper part of the site. The presence of tools, burnt bone and lithic waste in the upper layers here suggests that this part of the site was not near the periphery of the major area of habitation.

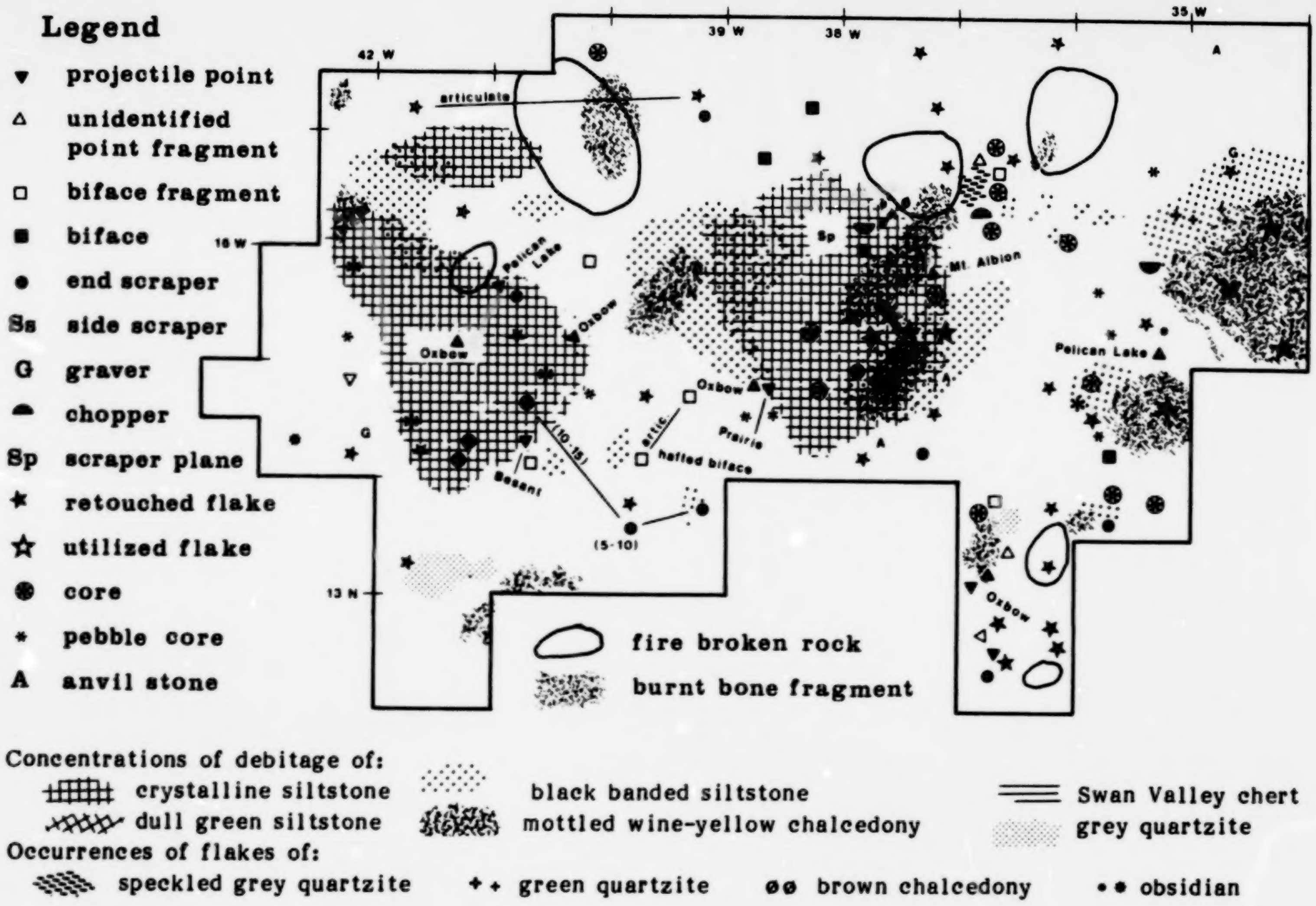

Legend
▼ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
core
* pebble core
A anvil stone
42 W
39 W
38 W
35 W
16 W
13 N
articulate
Pelican Lake
Oxbow
Besant
(10-15)
(5-10)
hafted biface
Prairie
Mt. Albion
Sp
G
A
fire broken rock
burnt bone fragment
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
+ + green quartzite
ø ø brown chalcedony
• • obsidian

Figure 84: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 20-25 cm below surface level.

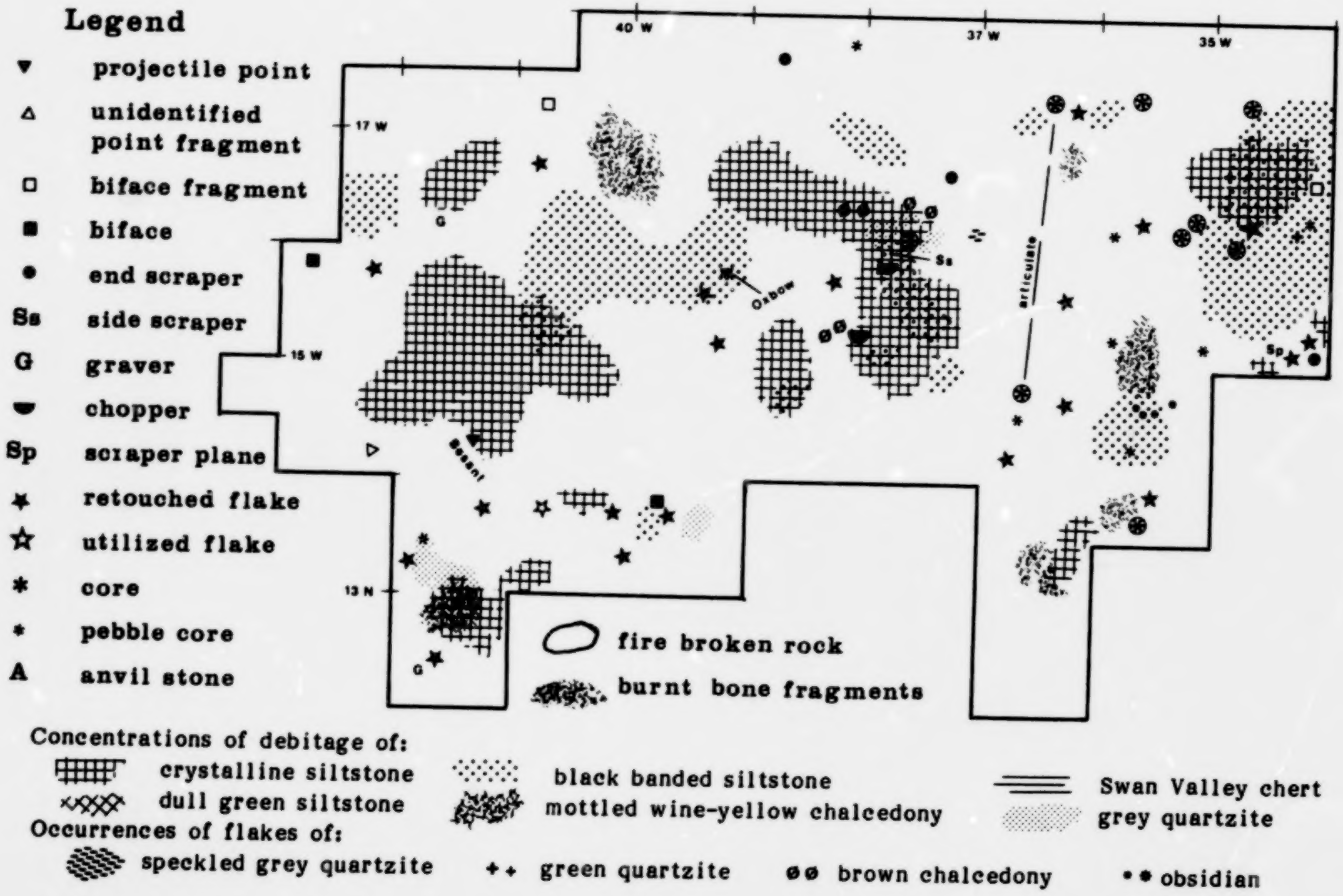

Legend
▼ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
✱ core
* pebble core
A anvil stone
40 W
37 W
35 W
17 W
15 W
13 N
G
Ss
Sp
Oxbow
Besant
articulate
fire broken rock
burnt bone fragments
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
✦ ✦ green quartzite
ø ø brown chalcedony
• ✱ obsidian

Figure 85: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 25-30 cm below surface level.

30-35 cm and 35-40 cm layers

The 30-35 cm and 35-40 cm layers contained refuse left by hunters during Paleo-Indian and Middle Prehistoric utilization of the site. In the 30-35 cm layer, four projectile points and a pebble core of speckled grey quartzite could be assigned to the Oxbow phase of occupation. Paleo-Indian artifacts recovered from this layer include an Agate Basin point, a possible channel flake fragment, an eared end scraper, and two gravers. One Oxbow and several Mount Albion and Agate Basin points were discovered in the 35-40 cm layer.

Obsidian pressure flakes were recovered from both layers in the vicinity of 14N 36W. The occurrence of obsidian pressure flakes in this area only in the 25-40 cm zone, and its absence in the 40-45 cm layer, suggests that this exotic lithic material had been brought to the Sibbald Creek site by hunters during the early part of the Middle Prehistoric Period. Perhaps the carriers had been the makers of the Mount Albion points. This assumption is supported by the fact that Maurice Doll (personal communications) mentioned finding obsidian associated with similar early corner-notched points at the Boss Hill site northeast of Red Deer.

Immediately to the west of this obsidian occurrence was a chipping station which contained close to 200 prepared platform percussion and pressure flakes and flake fragments of a mottled yellow-wine chalcedony or chert. Although flakes of this distinctive lithic material were found in the 30-35 cm and 35-40 cm layers, the greatest concentration was in the 40-45 cm layer.

In the 35-40 cm layer, the dominant cultural features are the two extensive lithic worksop areas in the central and northeastern parts of the Block Excavation. They extend down into the 40-45 cm layer. Both workshops contain prepared and unprepared platform percussion flakes of dull green crystalline siltstone, black banded siltstone, and grey quartzite. In addition, the central chipping station also had a small scattering of dull green siltstone flakes. The possible channel flake found in the 30-35 cm layer was made of a similar dull green siltstone.

The association of implements with lithic workshop areas again manifests itself in the 35-40 cm layer (Figure 87). Given the fact that repeated use of the site had obviously taken place, as reflected by the mixed nature of the components, the reason for this is unclear. However, it is likely that subsequent groups may have intentionally utilized the sparcely overgrown activity areas which had been littered and abandoned by previous occupants.

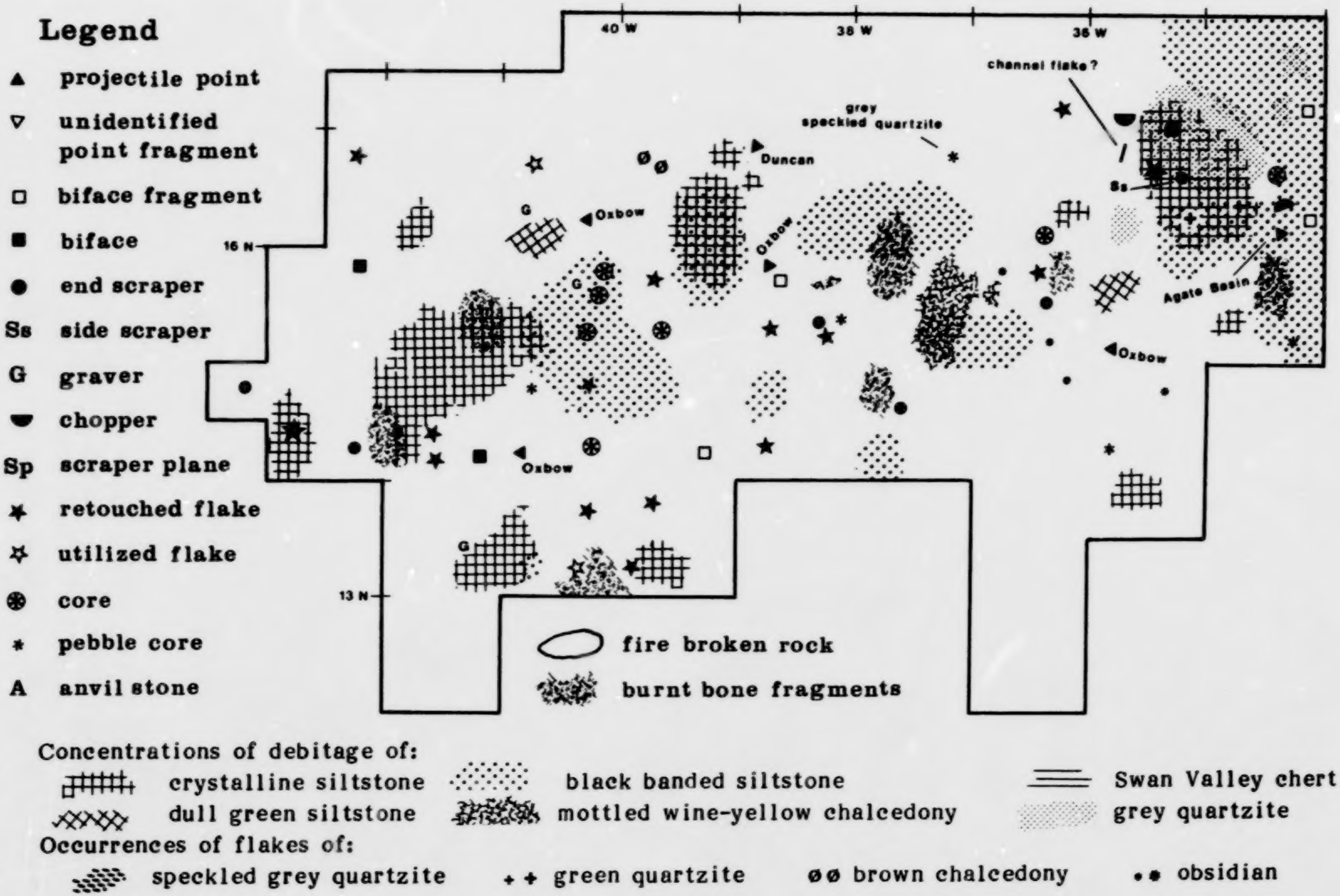

Legend
▲ projectile point
▽ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
retouched flake
utilized flake
core
* pebble core
A anvil stone
40 W
38 W
36 W
16 N
13 N
channel flake?
grey speckled quartzite
Duncan
Oxbow
Oxbow
Oxbow
Oxbow
Agate Basin
Ss
G
G
G
fire broken rock
burnt bone fragments
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
+ + green quartzite
ø ø brown chalcedony
• • obsidian

Figure 86: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 30-35 cm below surface level.

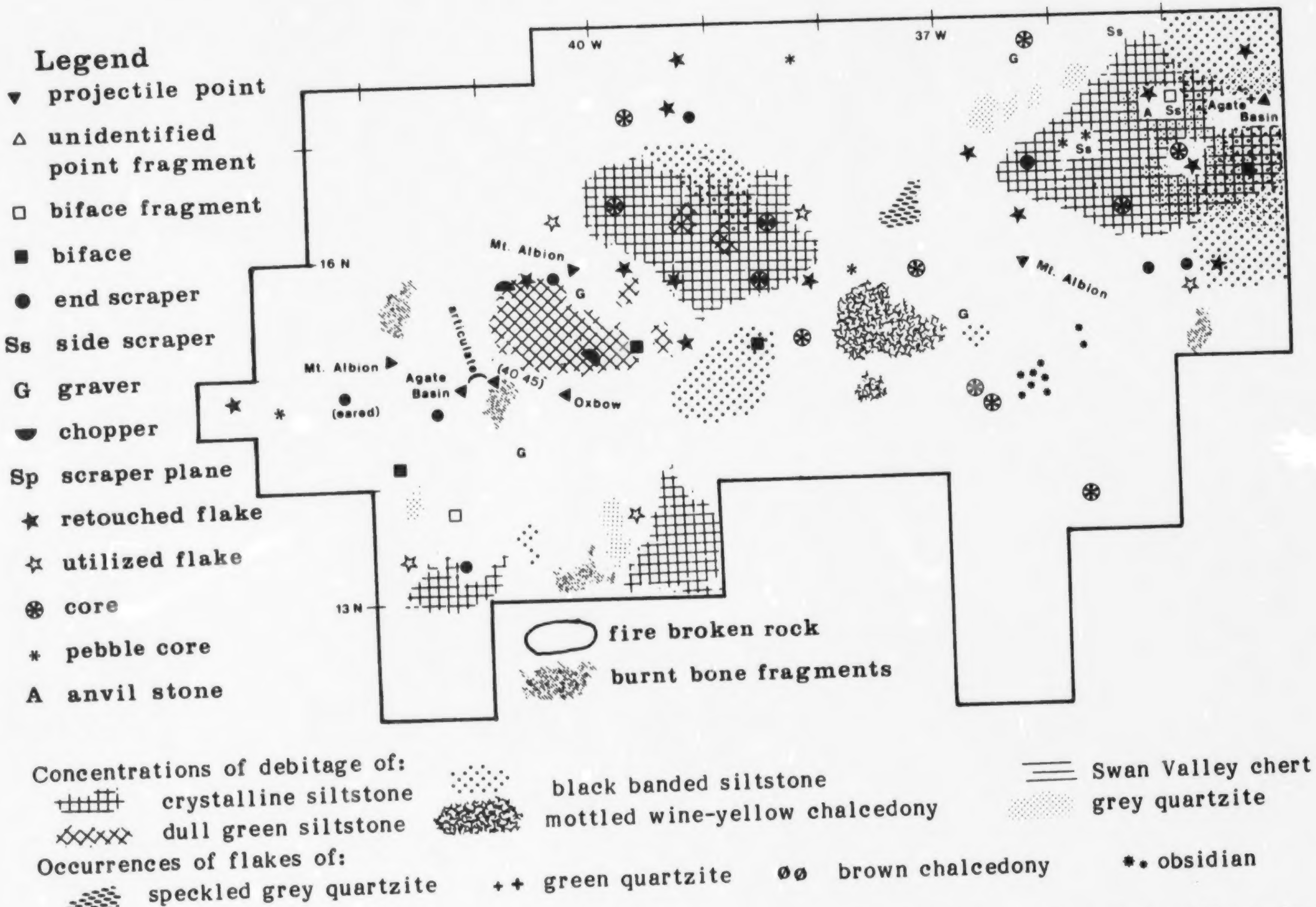

Legend
▼ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
⊛ core
* pebble core
A anvil stone
40 W
37 W
16 N
13 N
Mt. Albion
Agate Basin
articulate
(40 45)
Oxbow
(eared)
Ss
G
A
fire broken rock
burnt bone fragments
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
++ green quartzite
ØØ brown chalcedony
*• obsidian

Figure 87: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 35-40 cm below surface level.

40-45 cm layer

The diagram for this layer also includes a small number of artifacts recovered from the 45-50 cm layer. They are differentiated on Figure 88. Two Mount Albion, a Scottsbluff, an Agate Basin, a Midland, and two fluted points were recovered from the 40-45 cm level of the Block Excavation. Because of the obvious mixture of components, the more reliable interpretations concerning the cultural affiliation of implements and features at this level are those based upon associations by horizontal proximity.

The conspicuous lithic workshop stations which were already noted for the 30-40 cm zone are the dominant features in the 40-45 cm level and may well relate to the Paleo-Indian occupation. The base of the Midland point and the complete fluted specimen both occurred within the large central lithic workshop while the broken fluted point came from just beyond the northern boundary of this feature (Figure 88). This association, plus the occurrence of dull green siltstone flakes, suggests that the central chipping station relates to occupation of the site by people of the Fluted Point Tradition. Two of the Agate Basin points were discovered in the vicinity of the large chipping station located in the northeastern corner of the Block Excavation and may, in fact, be directly associated with it.

At this level the tools identified as side scrapers, plus a significant number of retouched flakes, were retrieved from the context of the two large workshops, particularly the central one. From this association of discarded points, scraping tools and chipping detritus it is possible to infer that the central workshop was a place where spear shafts were whittled out and fitted with new points. The occurrences of a possible channel flake of dull green siltstone a short distance from the central lithic waste concentration, and a fluted point of dull green crystalline siltstone within it, is an indication that the knapping of projectile points was also one of the activities performed at this spot. The absence of lateral edge smoothing on the complete fluted point and its relatively small size (Figure 30 c) suggest that this weapon point may have been found to be unsuitable and was intentionally discarded at the workshop by the prehistoric craftsman.

A local chipping station centered around unit 15N 37W contained debitage of mottled wine chalcedony. It started to appear in the 30-40 cm zone, but as the greatest concentration of flakes occurred at the 40-45 cm level, it is thought to be of Paleo-Indian origin. The larger flakes displayed ground, prepared platforms. Many of the flakes lacked the central dorsal ridge and thus appeared quite flat in transverse cross section. One single spurred end scraper of this mottled chalcedony (Figure 57 Type 5) was discovered in the 35-40 cm layer in the northeast quadrant of 15N 42W. A small cluster of pressure flakes of this identical lithic material was encountered only two meters to the southeast of the end scraper, but in the 40-45 cm layer. Because most of them are relatively long and narrow and have a fairly flat longitudinal cross section, these pressure flakes are thought to have been derived from biface reduction, rather than end scraper resharpening.

One other observation concerning the distribution of artifacts from the Paleo-Indian horizon deserves some comment. In the vicinity of the chalcedony workshop there is an apparent clustering of gravers and eared end scrapers. A similar association may be present in the southwest corner of the Block Excavation (Figures 87 and 88). It may be that the spurs on both of these specialized tool types had served similar purposes.

The areas devoid of artifacts or features evident in the northwest and southeast corners of the Block Excavation at the 35-45 cm zone may have been the places where tents or lodges once stood. A much better location for the dwellings would have been the sheltered area near the base of the hill immediately to the northeast of the Block Excavation. The extensive lithic workshop area that was partly uncovered in the northeast corner of the excavations in the 35-40 and 40-45 cm levels is believed to have been intersected in the northwest quadrant of 17N 32W and in the northeast quadrant of 19N 34W. If this is the case then it would appear that this part of the terrace, too, had been intensively utilized during the Paleo-Indian occupations.

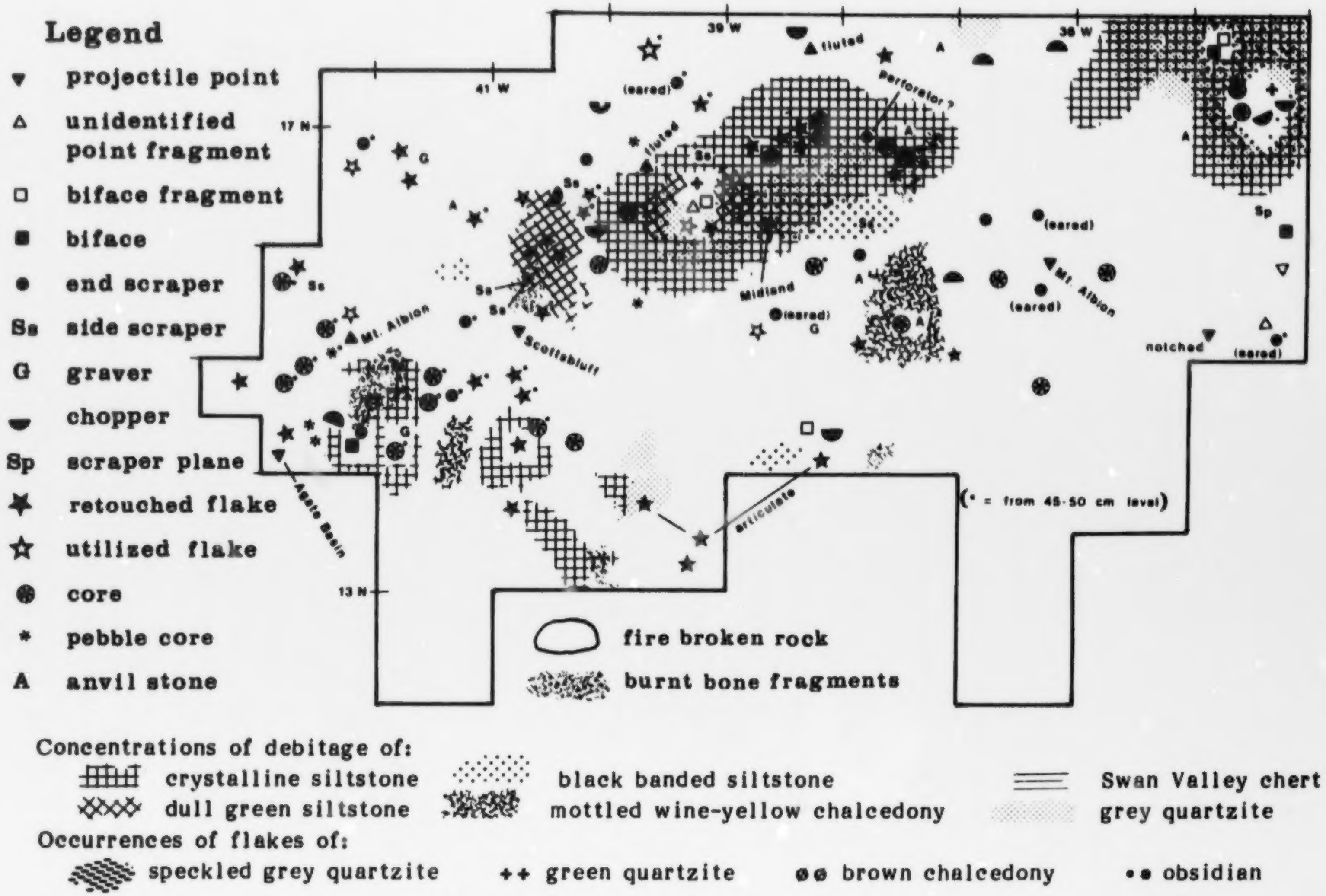

Legend
▼ projectile point
△ unidentified point fragment
□ biface fragment
■ biface
● end scraper
Ss side scraper
G graver
chopper
Sp scraper plane
★ retouched flake
☆ utilized flake
core
* pebble core
A anvil stone
17 N
13 N
41 W
39 W
38 W
(eared)
fluted
Perforator ?
Midland
Mt. Albion
Scottsbluff
Agate Basin
articulate
notched
(• = from 45-50 cm level)
fire broken rock
burnt bone fragments
Concentrations of debitage of:
crystalline siltstone
dull green siltstone
black banded siltstone
mottled wine-yellow chalcedony
Swan Valley chert
grey quartzite
Occurrences of flakes of:
speckled grey quartzite
++ green quartzite
øø brown chalcedony
•• obsidian

Figure 88: Block Excavation area of site EgPr-2 showing the distribution of features and artifacts in the 40-45 cm below surface level.

PART VI: THE HISTORIC CULTURAL MATERIAL FROM SITE EgPr-2

INTRODUCTION

The Sibbald Creek site continued to be used on occasions even during the historic period. Two separate episodes of occupations are evident from the debris recovered: one dating to roughly between 1850 and 1870, and the other relating to sporadic use sometime between 1940 and 1960. The refuse from the earlier phase is tentatively attributed to Assiniboine use of the site. As for the more recent items, they may have been left by people from the Stoney Reserve at Morley, by ranchers, tourists, or employees of the Bow-Crow Forest Reserve. The relative age of a few of the items was not determined. Artifacts relating to the earlier period of use were distributed irregularly over the central and eastern parts of the core area of the site, while those attributed to the later period were clustered east of the Block Excavation in the vicinity of unit 11N 24W.

NINETEENTH CENTURY HISTORIC MATERIAL

The items that are thought to relate to the nineteenth century use of the Sibbald Creek site are described first. They reflect a diversity of functions and, perhaps represent a social unit, or units, comprising members of both sexes. The items include glass, metal and ceramic utensils and containers, pipes, blobs of lead, decorative paraphernalia, and a portion of an awl.

Bottles (N=2)

A largely reconstructed bottle and the neck and some body fragments of a possibly identical example (Figure 89 a and b) were recovered from the excavations. The neck fragment still contained a metal corkscrew and fabric stopper. On the corkscrew ring is stamped in capital letters the words "PAIN KILLER". Both bottles are made of a light green tinted glass. The reconstructed example is 52.0 mm long, 45.5 mm wide and 27.0 mm thick. Both bottles were formed in a two piece mould, a technique which was used into the first decade of this century (Chopping 1978:11). Perry Davis was the first to produce the "Painkiller" concoction in 1840 and registered it in 1845 (Holbrook 1959:149). However, many imitations soon appeared on the market and it is likely that the bottles from EgPr-2 are not from the genuine Perry Davis Painkiller.

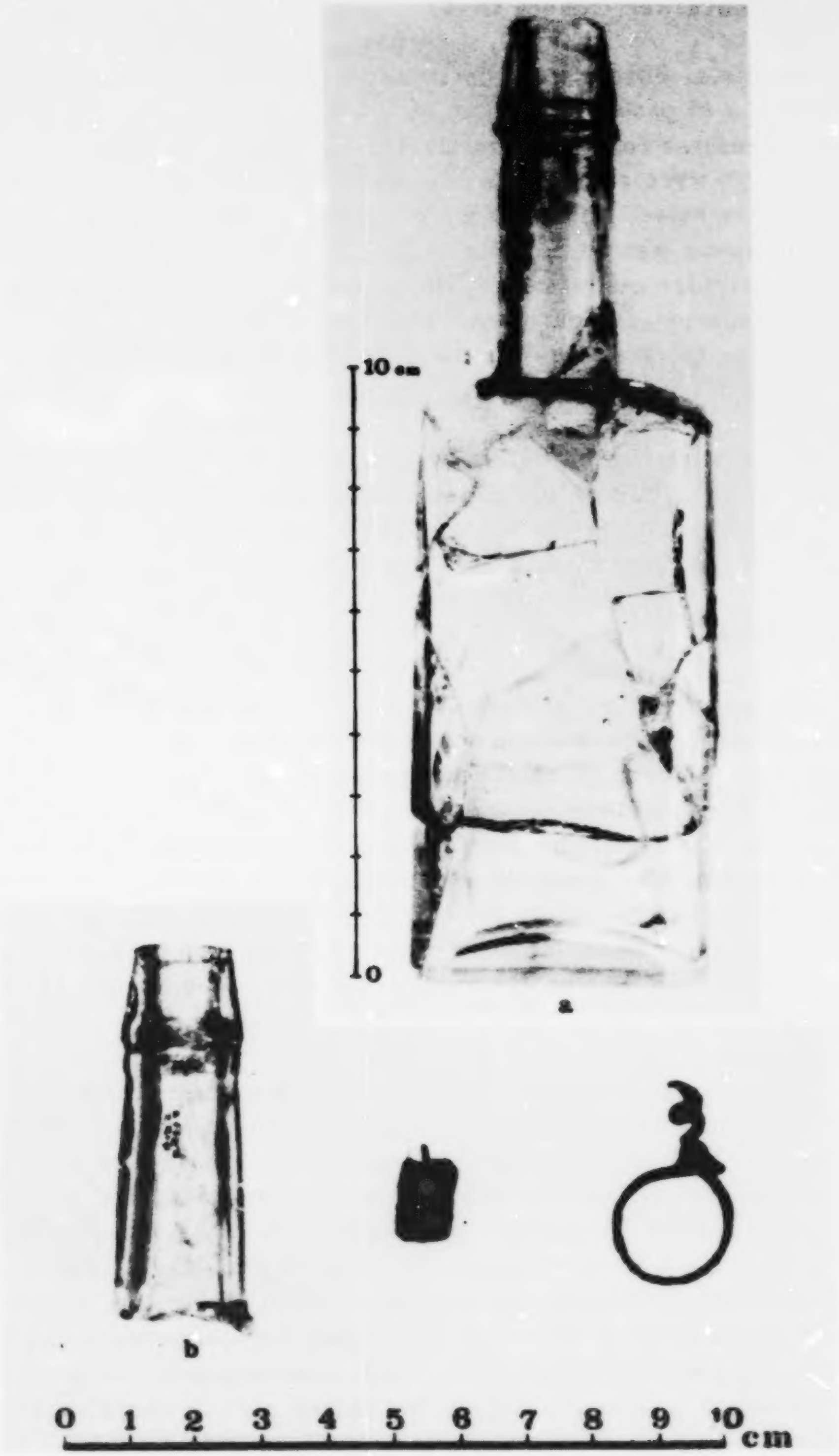

10 cm
0
a
b
0 1 2 3 4 5 6 7 8 9 10 cm

Figure 89: Reconstructed example and neck portion of "Painkiller" medicine bottles from the Sibbald Creek site.

Metal Container Covers (N=6)

Six metal covers were discovered at EgPr-2. At least one of these (Figure 90 a) probably dates to the latter half of the last century. The cover measures four centimeters in diameter. The words "ELEY" and "LONDON" were stamped on the cover from the inside so that the letters are raised on the outside. According to Thomas (1978:34), the Eley company was founded in 1828. In 1849 it took out a patent for small cartridge containers. The metal cover may be from one of the Eley percussion cap carriers. If the identification is correct then this would date the presence of the Eley cover at the Sibbald Creek site to sometime after 1849.

Three other metal covers (Figure 90 b, c and d) may, or may not, date to the middle of the nineteenth century. None of these examples have any identifying lettering. The remaining two metal covers are from recent tobacco containers and will be mentioned later on.

Pipes (N=4)

One complete metal example, a partially reconstructed clay model, and two stem fragments were discovered at EgPr-2 (Figure 91). The metal pipe (Figure 91 c) appears to be of domestic manufacture. It is made of a highly tarnished, soft, silvery metal which may be either lead or pewter. In form, the pipe resembles the kaolin ones which were quite common throughout the last half of the eighteenth century at many North American fur trade posts (Kehoe 1978:26). The end of the stem appears to have been deformed when the pipe was held, not in its normal upright position, but on a horizontal plane. The bowl is 27.7 mm high and 24.2 mm across at its widest part.

The reconstructed pipe (Figure 91 d) is a clay effigy model which was manufactured in a two piece mould. The bowl depicts a man dressed in a turban and sporting a mustache. Although the pipe is not complete, the indications are that the design covered the entire circumference of the bowl. The broken pipe stem has been resharpened to fit the mouth or a holder. The pipe bowl is relatively deep. It is 45.0 mm high on the outside and 23.0 mm in diameter. In his search of the collections at Parks Canada, Calgary for comparable examples, G. Lutick (personal communication 1981) observed that effigy pipes were most common in Alberta during the latter part of the nineteenth century. He suggested a European, possibly British, source for the one found at the Sibbald Creek site. The shape of the pipe from which either of the two stem fragments came could not be determined.

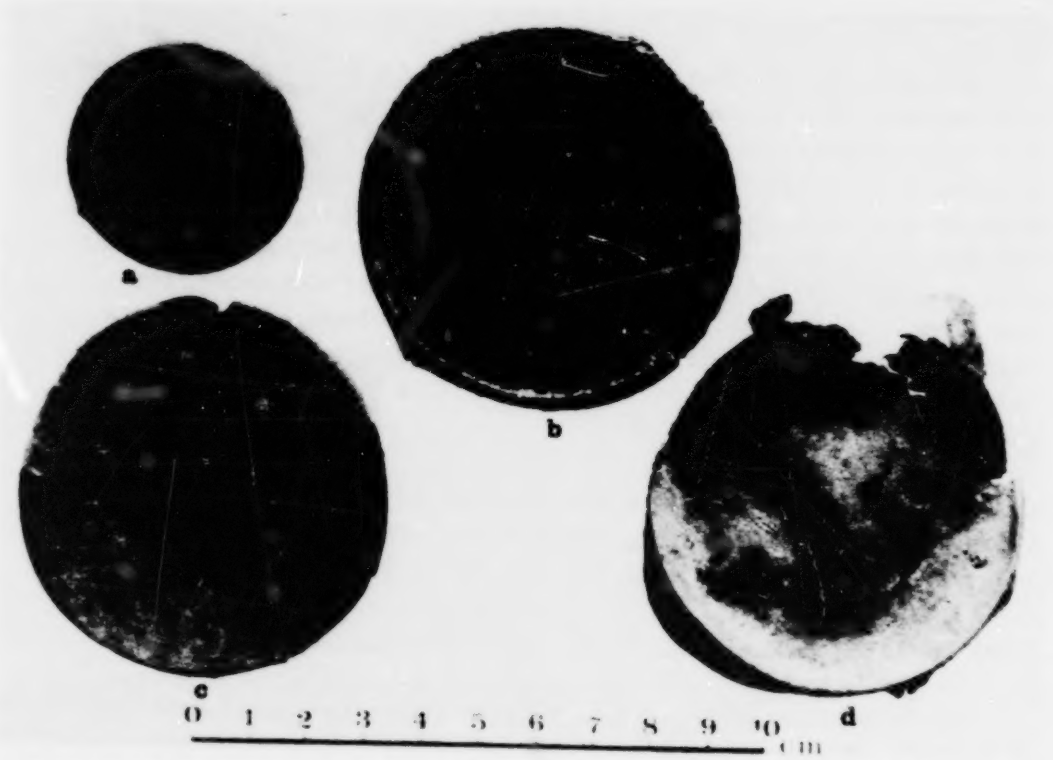

a
b
c
d
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 90: Metal covers from the Sibbald Creek site. Their Cat. Nos. are 6349 (a), 1183 (b), 6551 (c), and 6550 (d).

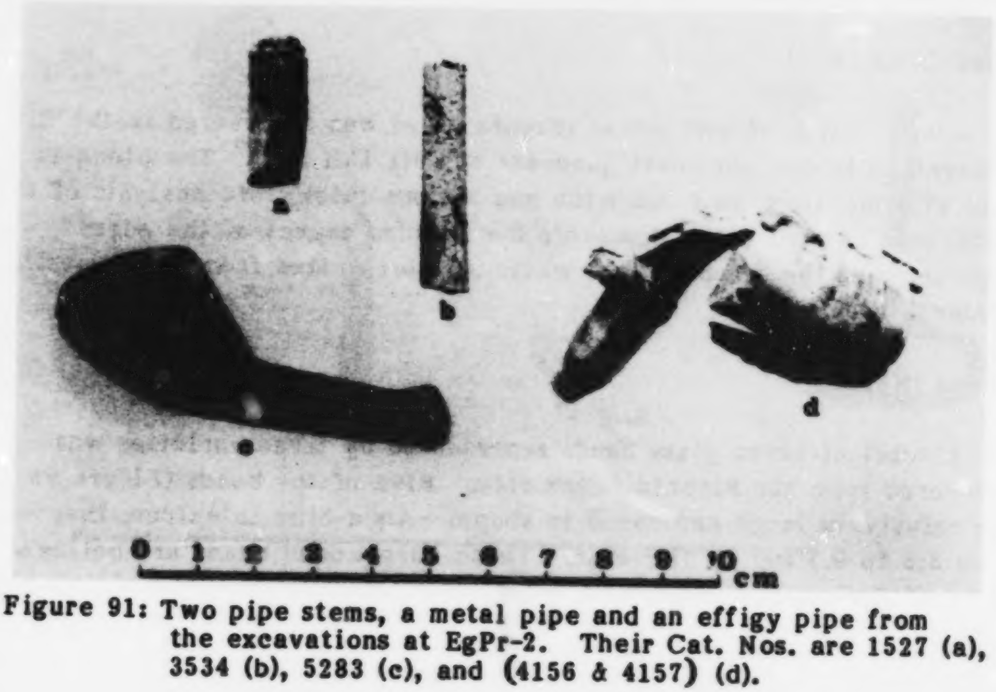

a
b
c
d
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 91: Two pipe stems, a metal pipe and an effigy pipe from the excavations at EgPr-2. Their Cat. Nos. are 1527 (a), 3534 (b), 5283 (c), and (4156 & 4157) (d).

Teaspoon (N=1)

Another artifact that may date back to the use of EgPr-2 during the last century, is a spoon (Figure 92) which bears the mark "SHEFFIELD PLT. CO." stamped on its back. It is made of a copper alloy and appears to have been originally silver plated. According to Hume (1969:90 and 184), Sheffield plating was first begun in 1742 and was replaced by the electroplating method in 1840. While it could not be ascertained which process had been used to plate the spoon, the intricate design work present on the front and back of the handle suggests a nineteenth century date for this item.

Awl (N=1)

The tip of an iron awl or nail (Figure 93 d) was found in the vicinity of the ELEY cover. The tip is flattened and slightly twisted. The fragment is 29.1 mm long and 4.3 mm at its thickest point.

Tack (N=1)

One brass tack (Figure 93 b) with an umbrella-shaped head was found at EgPr-2. It is only 12.8 mm long. G. Lutick (personal communication 1981) mentioned that similar specimens were recovered from Rocky Mountain House, Alberta which was occupied during 1799-1821 and 1835-1861.

Lead Blob (N=1)

A small blob of soft metal (Figure 93 a) was discovered in the Block Excavation in the southeast quadrant of unit 13N 39W. The piece is only 17.5 mm long, 13.0 mm wide and 2.2 mm thick. No analysis of the metal was carried out. However, the rounded aspect of the edges suggests that the scrap is lead waste which resulted from the domestic production of shot.

Beads (N=7)

A total of seven glass beads represented by three varieties was recovered from the Sibbald Creek site. Five of the beads (Figure 93 e) are relatively large and round in shape. Aqua-blue in colour, they vary from 8.5 to 9.3 mm in diameter. These wire wound beads are believed to be of European manufacture.

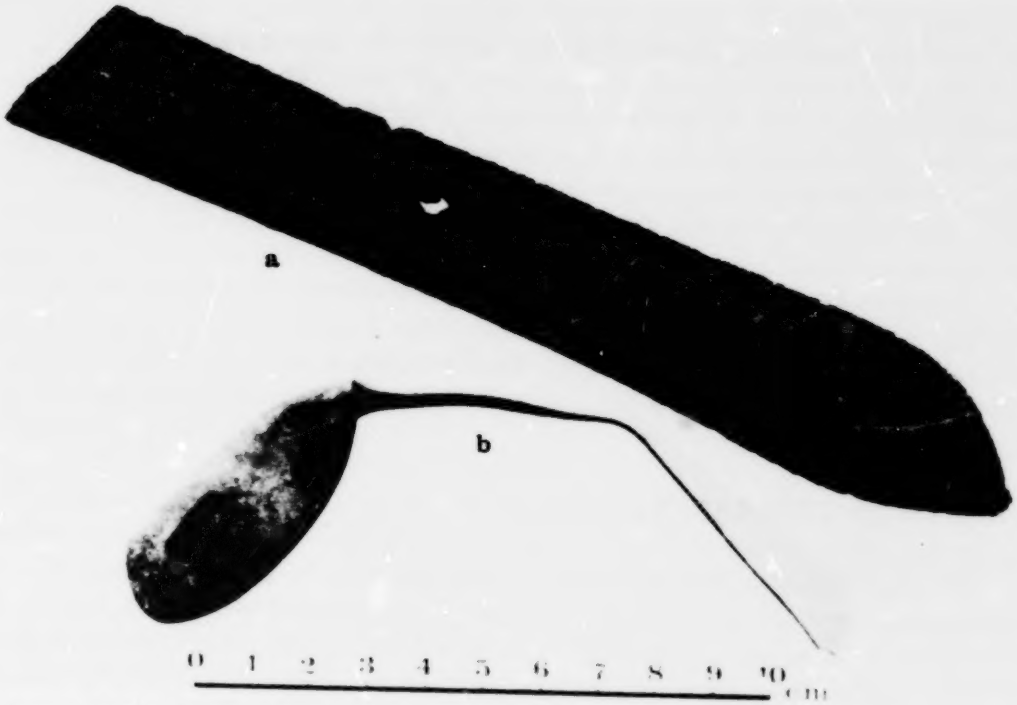

a
b
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 92: A knife blade, Cat. No. 3532 (a), and a "SHEFFIELD" teaspoon, Cat. No. 3881 (b), from EgPr-2.

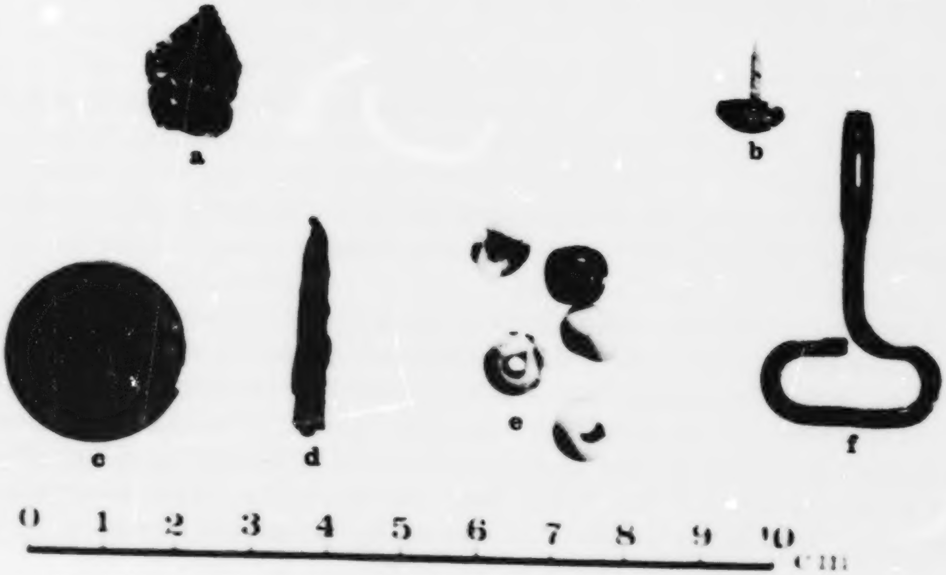

a
b
c
d
e
f
0 1 2 3 4 5 6 7 8 9 10
cm

Figure 93: Early and recent historic period artifacts from EgPr-2. Included are a scrap of lead (a), a brass tack (b), a shotgun casing (c), an awl or nail fragment (d), one olive-green and four aqua-blue round beads (e), and a metal can opener (f).

Another bead (Figure 93 e) is similar to the above examples but differs only in that it is of a dark green colour. These large round beads are classified by Kidd and Kidd (1970:84) as Type Wlb examples. According to G. Lutick and J. Svencicki (personal communication 1981) similar examples were recovered during the excavations of the 1835-1861 and 1865-1875 phase sites of Rocky Mountain House.

The last example is a multi-faceted transparent blue bead. It is smaller than the above round beads, having a length of 5.0 mm and a diameter of 6.1 mm. It, too, is of European manufacture. Examples of this type were also encountered at the excavations at Rocky Mountain House.

TWENTIETH CENTURY MATERIAL

The items which suggest a relatively recent use of the Sibbald Creek site include nine one inch long round wire shingle nails, a plastic button, a cap and fragment from a beer bottle, a .22 calibre rim-fire "D" cartridge casing, a brass shotgun shell casing with a head stamp designation of "D. C. Co. No. 12 VULCAN" (Figure 93 c), a metal key (Figure 93 f), a plain metal can, and covers from "Player's" cigarette tobacco and "Copenhagen" snuff containers. In addition, there were several scraps of rubber, plastic, and portions of a soft metal container such as the ones from shaving cream or tooth paste. The majority of these items came from the vicinity of unit 11N 24W.

The other items that came from this part of the site are two fragments of a bone china tea cup and 45 small pieces of a thin-walled, clear glass object. This clear glass varies in thickness from 0.9 to 1.0 mm. The diameter, as reconstructed from part of a rolled rim, was in the order of 57.0 mm. It is suspected that the fragments might be from a goblet, or more likely, from a lamp chimney.

A badly rusted iron knife blade (Figure 92) came from the western end of the Block Excavation in the northeast quadrant of unit 14N 41W. It had a rivet-attached, probably wooden, handle. In form it resembles modern machine-made knives. A nine inch metal pie plate or dish was found near by in the northwest quadrant of unit 13N 39W. It was in a more advanced stage of corrosion than was the knife. The occurrence of these two items in the vicinity of two of the nineteenth century artifacts, the "Sheffield" spoon in the southeast quadrant of unit 14N 44W and the olive-green round bead in the northeast quadrant of unit 14N 43 W, suggests that perhaps the knife and plate, too, relate to the Indian occupation of the site during the last century.

PART VII: SUMMARY AND CONCLUSIONS

This report has focused on presenting a fairly detailed account of the findings stemming from salvage excavations at a major archaeological site situated in the southern Alberta Foothills. Designated EgPr-2, the Sibbald Creek site is located at Sibbald Flat some 72 kilometers west of Calgary. Brief statements were made about the unencouraging results of the evaluative tests conducted at site EgPr-5 and EgPr-6. The investigations of these two sites, which are located less than a kilometer west of EgPr-2, were carried out under the same archaeological agreement as were the salvage excavations at the Sibbald Creek site.

Understandably, much of the preceding text has dealt with the description and interpretation of the artifacts and features recorded for the Sibbald Creek site. A detailed summary of the faunal remains encountered in the excavations is presented in Appendix II. Perched on a protected terrace high above Sibbald Flat, EgPr-2 is an excellent example of very deliberate campsite selection on the part of its past inhabitants. Here, the proximity to water was a concern secondary to that of shelter from the elements, seclusion, and vantage over the surrounding terrain. In spite of its relatively shallow nature and poor stratification, this site yielded a wide array of artifacts which reflect a sequence of almost continuous but periodic occupation that began when people of the Fluted Point Tradition camped here, and ended with the introduction of domestic animals and contemporary land usage regulations. Most of the prehistoric complexes recognized in the archaeological record established for southern Alberta and the Northern Plains are represented at EgPr-2.

Many observations were made regarding the prehistoric and historic period cultural remains recorded for the Sibbald Creek site and it is not our intention to reiterate them here. However, there are a number of important findings that we feel bear repeating. Perhaps the most significant result of the archaeological work was the discovery of artifacts of the Fluted Point Tradition in an excavated campsite for the first time in western Canada. Hopefully, other similar finds, but displaying much better separation of the various components, will soon follow.

The discovery of the convex-based, corner-removed points, which are very reminiscent of the Mount Albion style, in context below the Oxbow zone is significant because it suggests that styles of projectile points different from the square-based, side-notched Bitterroot or Logan Creek forms may date back to the early part of the Middle Prehistoric Period and could be dependable chronological markers. The occurrence of these points in relatively early context at EgPr-2 lends support to the information gleaned from the Boss Hill site near Red Deer (Doll 1982). It would be interesting to know if the obsidian which occurs in the lower levels of the Sibbald Creek site and that reported for Boss Hill (Doll personal communications 1981) had been brought in by the makers of the corner-notched points and if it had been obtained from the same source.

One of the primary objectives of the 1980 archaeological project was realized. This was the excavation of a large area of contiguous units within the core area of EgPr-2. This "Block Excavation" as it came to be referred to, provided most of the information concerning the historical nature of the site and the horizontal spacing of activity areas. Tables and graphs were relied upon in order to convey more clearly, the vertical, or temporal distribution of various projectile point styles, tools, and lithic debris that were abandoned by the various occupants of the Sibbald Creek site. Distribution maps showing the location and perceived associations of various artifacts and activity areas were included in the main text and in Appendix II to depict the campsite structure for each five centimeter layer.

The stone artifacts and debitage reflect an overwhelming reliance by the prehistoric craftsmen upon the use of locally available lithic materials. The source of many of the siltstones, quartzites and pebble cherts was probably the north slope of the Sibbald Creek valley immediately below EgPr-2. Many tools were expeditiously fashioned and then abandoned at the place they were last used. The distribution of the cultural refuse made it possible to identify which areas of the site were used for cooking, bone grease preparation, tool manufacture, hide processing, and perhaps, dwelling locations. If the large lithic workshop areas are the products of individual artisans, then they might serve as a means of provisionally estimating the number of families that inhabited the site, particularly for the lower levels of the deposits where well-defined fire hearths were not encountered. Of course, additional excavations would be required in order to totally isolate each of the major workshops. But, even then, the task of determining which features relate to the same occupation event may prove impossible. Using the area of the site as the primary criterion it is postulated that the usual aggregate of hunters that occupied EgPr-2 comprised between four to six family units. This crude estimate must obviously be considered to be highly speculative until it is proven otherwise.

Faunal remains were preserved only in the upper few levels of the Sibbald Creek site, while below that there were only tiny bits of calcined bone. Nevertheless, the osteological data summarized in Appendix II do give an indication of what animal species were hunted, and the butchering and processing techniques that were employed during the Late Prehistoric Period and the latter part of the last century. They may also offer a good reflection of the situation that probably prevailed at EgPr-2 throughout much of prehistory.

The faunal remains from EgPr-2 showed a dichotomy between the bison bones which bore butchering marks left by stone or bone tools, and the non-bison elements which displayed cuts and chop marks made by steel implements. On the basis of this evidence, and the close association of the concentrations of bison remains with hearths, projectile points, and other artifacts, it appears that the bison bones relate to the occupation of EgPr-2 by the makers of Plains Side-Notched points during the Late Prehistoric Period. However, the non-bison elements which displayed marks left by steel tools were attributed to the historic period Indian or Metis use of EgPr-2. The absence of gun flints or the early center-fire cartridge cases, and the presence of "PAIN KILLER" and "ELEY" containers, serves to bracket the early historic native use of the site to between 1850 and the time when Frank Sibbald established his ranch at Sibbald Flat, during the 1880s. The absence of undisputed bison bones bearing convincing marks made by steel tools suggests that the native use of the Sibbald Creek site occurred after the almost total destruction of the last great bison herd on the Northern Plains in 1881 (Dempsey 1972:127); that there still were some bison around but none were in the immediate vicinity of Sibbald Flat at the time; or, that some animals had been killed but they had been butchered in a manner which left their remains indistinguishable from those which are thought to date back to the Late Prehistoric Period. Of these three alternative hypotheses, the last seems to be the one least likely.

The evidence obtained through the analysis of the bison dental remains provisionally suggests that the animals were killed during the late fall season. This observation is also supported by the complete lack of any fetal elements amongst the faunal remains. The general seasonal movement of bison off the Plains in winter into the shelter of the Foothills and the Parkland zones to the north and east has been examined by various writers, most recent of which are Gordon (1979:24-39) and Morgan (1980:143-160). Gordon (1979:Figures 2 and 3) indicates that the herds that pastured on the open plains of southern Alberta during the summer months, moved west into the Foothills during the autumn and winter months. He acknowledges (ibid.:33) that snow conditions, fires, and hunting pressures may have disrupted the general pattern of seasonal movement at the local level. Apparently, as illustrated by the following quotation extracted by Morgan (1980:157) from Grinnell (1962:234), native groups were well adapted to these seasonal migrations:

> As spring opened, the buffalo would move down to the more flat prairie country away from the pis'kuns. Then the Blackfeet would also move away. As winter drew near, the buffalo would again move up close to the mountains, and the Indians, as food began to become scarce, would follow them towards the pis'kuns.

Sibbald Flat, comprising some 800 hectares, together with a number of smaller local meadows, would have offered sufficient pasturage to support a small herd of bison throughout the winter months. If the bison remains recovered from the upper layers of the Sibbald Creek site are a reasonable reflection of the situation which prevailed here throughout much of the prehistoric period, then we can assume that the primary function of EgPr-2 was that of a winter campsite. The presence of bison on the Flat nearby, its sheltered southern exposure, proximity to an abundant supply of firewood, and its location in an area that is frequently affected by the warm chinook winds, certainly must have made the Sibbald Creek site a much more pleasant place to spend the winter than did the wooded river valleys in the middle of the open plain to the east.

Judging from the minimum number of animals and the types of elements and butchering units which are registered in the faunal remains retrieved from the excavations, it seems likely that the bison had been taken on an individual basis rather than killed *en masse*. The precipitous north side of the Sibbald Creek valley would have made a rather spectacular setting for a bison jump had the landscape away from the valley edge to the headwaters of Bateman Creek been open and the animal and human resources been available. Today, the terrain extending away from the valley rim is dominated by a pine forest. No special search was undertaken along the valley rim for features that might suggest possible drive lanes. Neither was the base of the 50 meter high valley slope tested for deposits which would indicate that bison driving had, indeed, been practiced here.

A seasonal movement of bison out of the Foothills was necessitated by the depletion of their range over the winter months. With the arrival of warmer weather they would have returned to the Plains, and their human predators followed in their wake. This is not to imply that prehistoric hunters completely avoided Sibbald Flat during the summer months. On the contrary, there may have been occasions when some bison lingered behind, and the region unquestionably supported deer, elk, moose, bear, beaver, or other species of animals which could have provided a viable subsistence base for a few families. It was observed during the 1980 season at Sibbald Flat that no saskatoon or choke cherry trees were present among the local plant communities. The fruit of these trees was a common ingredient used in pemmican. The quest for these and perhaps other essential, but locally unavailable resources may have driven the hunters to lower elevations during the summer months.

The potential of Sibbald Flat was known to prehistoric hunters since at least the time when people of the Fluted Point Tradiition camped at EgPr-2 some 10,000 to 11,000 years ago. The area is situated 11 kilometers from the eastern edge of the Plains, and an almost equal distance from the Front Range of the Rocky Mountains. The archaeological evidence gathered from EgPr-2 showed that people had been drawn to the area from both the Plains and Rocky Mountain environments, and probably also from the surrounding Foothills.

A detailed discussion of the regional prehistory of the Southern Alberta Foothills is beyond the scope of this report. Much of the data is still to be acquired. Unquestionably, sites of a caliber comparable to EgPr-2 will be discovered in some of the neighboring valleys and may supplement or extend the present record of prehistoric occupation. They, along with the Sibbald Creek site, should provide more specific information on or supplement already identified patterns of past human adaptations to this diverse and intriguing regional environment.

APPENDIX I

TABLES OF DETAILED QUANTITATIVE AND QUALITATIVE DATA REFERRED TO IN THE MAIN TEXT OF THE REPORT

Table Ap-1: Detailed results of the hydrometer and sieve analyses on the soil samples obtained from the Sibbald Creek site

EL. TIME = elevation time
HYDR. = hydrometer
CORRN = correction factor
T DEG C = temperature in degrees Celsius
K FCT = K factor
L FCT = L factor
DIAM. MM. = diameter in millimeters
PHI = Phi unit
PCT. FNR = percent finer
WT. GMS. = weight in grams

EL. TIME	HYDR	CORRN	T DEG C	K FCT	L FCT	DIAM MM	PHI	PCT FNR
0.3	52.0	1.5	22.5	0.01304	7.8	0.07287	3.78	73.19
0.5	48.5	1.5	22.5	0.01304	8.3	0.05331	4.23	68.12
1.0	44.5	1.5	22.5	0.01304	9.0	0.03913	4.68	62.32
2.0	41.0	1.5	22.5	0.01304	9.6	0.02858	5.13	57.25
5.0	36.5	1.5	22.5	0.01304	10.3	0.01872	5.74	50.72
10.0	33.5	1.5	22.5	0.01304	10.8	0.01356	6.20	46.38
15.0	31.5	1.5	22.5	0.01304	11.1	0.01125	6.47	43.48
30.0	28.0	2.0	22.5	0.01304	11.7	0.00815	6.94	37.68
60.0	25.5	2.0	22.5	0.01304	12.1	0.00586	7.42	34.06
120.0	22.5	2.0	22.5	0.01304	12.6	0.00423	7.89	29.71
240.0	20.0	2.0	23.0	0.01297	13.0	0.00302	8.37	26.09
480.0	18.5	2.0	23.0	0.01297	13.2	0.00215	8.86	23.91
1440.0	16.0	2.5	21.0	0.01328	13.7	0.00130	9.59	19.57

------------------ SIEVE RESULTS ------------------

DIAM MM	WT GMS	PHI	PER CENT	PCT FNR
2.000	0.0	-1.00	0.0	100.00
1.000	0.28	-0.0	0.38	99.62
0.500	1.39	1.00	2.02	97.60
0.250	2.98	2.00	4.32	93.28
0.125	4.78	3.00	6.93	86.35
0.063	8.18	3.99	11.86	74.50

EL. TIME	HYDR	CORRN	T DEG C	K FCT	L FCT	DIAM MM	PHI	PCT FNR
0.3	41.0	2.0	22.0	0.01312	9.6	0.08130	3.62	74.80
0.5	38.0	2.0	22.0	0.01312	10.1	0.05897	4.08	69.04
1.0	35.0	2.0	22.0	0.01312	10.6	0.04272	4.55	63.29
2.0	32.0	2.0	22.0	0.01312	11.1	0.03091	5.02	57.54
5.0	29.0	2.0	22.0	0.01312	11.5	0.01990	5.65	51.78
10.0	26.5	2.0	22.0	0.01312	11.9	0.01434	6.12	46.99
15.0	25.0	2.0	22.0	0.01312	12.2	0.01183	6.40	44.11
30.0	23.0	1.5	22.5	0.01304	12.5	0.00842	6.89	41.24
60.0	21.0	1.5	22.5	0.01304	12.9	0.00605	7.37	37.40
120.0	10.9	2.0	23.0	0.01297	14.6	0.00452	7.79	17.07
240.0	17.0	2.0	23.0	0.01297	13.5	0.00308	8.34	28.77
480.0	15.5	2.0	23.0	0.01297	13.7	0.00220	8.83	25.89
1440.0	14.0	2.5	21.0	0.01328	14.0	0.00131	9.58	22.08

------------------ SIEVE RESULTS ------------------

DIAM MM	WT GMS	PHI	PER CENT	PCT FNR
2.000	0.08	-1.00	0.17	100.00
1.000	0.39	-0.0	0.78	99.24
0.500	1.18	1.00	2.28	96.99
0.250	5.30	2.00	10.18	86.83
0.125	3.63	3.00	6.96	79.87
0.063	6.48	3.99	12.43	67.48
0.063	1.31	4.24	2.52	64.93

EL. TIME	HYDR	CORRN	T DEG C	K FCT	L FCT	DIAM MM	PHI	PCT FNR
0.3	38.0	2.0	22.0	0.01312	9.9	0.08258	3.60	74.00
0.5	35.5	2.0	22.0	0.01312	10.5	0.06012	4.06	67.00
1.0	32.5	2.0	22.0	0.01312	11.0	0.04351	4.52	61.00
2.0	29.0	2.0	22.0	0.01312	11.5	0.03146	4.99	54.00
5.0	25.5	2.0	22.0	0.01312	12.1	0.02041	5.61	47.00
10.0	22.5	2.0	22.0	0.01312	12.6	0.01473	6.09	41.00
15.0	21.5	2.0	22.0	0.01312	12.8	0.01212	6.37	39.00
30.0	19.5	2.0	22.0	0.01312	13.1	0.00867	6.85	35.00
60.0	17.0	2.0	22.0	0.01312	13.5	0.00622	7.33	30.00
120.0	15.5	2.0	22.0	0.01312	13.7	0.00444	7.81	27.00
240.0	14.0	2.0	22.0	0.01312	14.0	0.00317	8.30	24.00
480.0	12.5	2.0	22.0	0.01313	14.3	0.00226	8.79	21.00
1440.0	10.5	2.0	21.5	0.01320	14.6	0.00133	9.56	17.00

------------------ SIEVE RESULTS ------------------

DIAM MM	WT GMS	PHI	PER CENT	PCT FNR
2.000	0.29	-1.00	0.58	100.00
1.000	0.56	-0.0	1.12	98.88
0.500	1.60	1.00	3.19	95.69
0.250	2.68	2.00	5.36	90.33
0.125	3.91	3.00	7.82	82.51
0.063	5.57	3.99	11.14	71.37

Table Ap-1: continued

```
EL  TIME    HYDR    CORRN   T DEG C     K FCT   L FCT  DIAM  MM       PHI      PCT  FNR
     0.3    41.0     2.0     22.0    0.01312    9.6     0.08130      3.62      77.37
     0.5    38.0     2.0     22.0    0.01312   10.1     0.05897      4.08      71.41
     1.0    34.5     2.0     22.0    0.01312   10.6     0.04282      4.55      64.47
     2.0    30.5     2.0     22.0    0.01312   11.3     0.03119      5.00      56.54
     5.0    25.5     2.0     22.0    0.01312   12.1     0.01863      5.75      46.62
    10.0    23.5     2.0     22.0    0.01312   12.4     0.01484      6.08      42.65
    15.0    22.0     1.5     22.5    0.01304   12.7     0.01200      6.38      40.67
    30.0    19.5     1.5     22.5    0.01304   13.1     0.00862      6.86      35.71
    60.0    17.0     2.0     23.0    0.01297   13.5     0.00615      7.34      29.76
   120.0    15.0     2.0     23.0    0.01297   13.8     0.00440      7.83      25.79
   240.0    13.0     2.0     23.0    0.01297   14.2     0.00315      8.31      21.82
   480.0    12.0     2.0     23.0    0.01297   14.3     0.00224      8.80      19.84
  1440.0    10.0     2.5     21.0    0.01328   14.7     0.00134      9.54      14.88
------------------ SIEVE RESULTS ------------------

  DIAM  MM    WT  GMS       PHI    PER CENT   PCT  FNR
    2.000        0.0       -1.00      0.0      100.00
    1.000        0.34      -0.0       0.67      99.33
    0.500        1.02       1.00      2.03      97.30
    0.250        2.08       2.00      4.13      93.17
    0.125        3.30       3.00      6.55      86.62
    0.063        6.61       3.99     13.11      73.51
```

```
EL  TIME    HYDR    CORRN   T DEG C     K FCT   L FCT  DIAM  MM       PHI      PCT  FNR
     0.3    41.0     2.0     22.0    0.01312    9.6     0.08130      3.62      78.00
     0.5    37.0     2.0     22.0    0.01312   10.2     0.05926      4.08      70.00
     1.0    33.0     2.0     22.0    0.01312   10.9     0.04332      4.53      62.00
     2.0    28.5     2.0     22.0    0.01312   11.6     0.03160      4.98      53.00
     5.0    22.5     2.0     22.0    0.01312   12.6     0.02083      5.59      41.00
    10.0    20.0     2.0     22.0    0.01312   13.0     0.01498      6.06      36.00
    15.0    18.0     2.0     22.0    0.01312   13.3     0.01235      6.34      32.00
    30.0    15.0     2.0     22.0    0.01312   13.8     0.00890      6.81      26.00
    60.0    13.0     2.0     22.0    0.01312   14.2     0.00638      7.29      22.00
   120.0    11.0     2.0     22.0    0.01312   14.5     0.00456      7.78      18.00
   240.0     9.0     2.0     22.0    0.01312   14.8     0.00326      8.26      14.00
   480.0     8.0     2.0     22.0    0.01312   15.0     0.00232      8.75      12.00
  1440.0     6.5     2.0     21.5    0.01320   15.2     0.00135      9.52       9.00
------------------ SIEVE RESULTS ------------------

  DIAM  MM    WT  GMS       PHI    PER CENT   PCT  FNR
    2.000        0.68      -1.00      1.37     100.00
    1.000        0.35      -0.0       0.70      99.30
    0.500        0.67       1.00      1.34      97.97
    0.250        1.08       2.00      2.15      95.82
    0.125        2.90       3.00      5.80      90.01
    0.063        7.13       3.99     14.27      75.75
```

```
EL  TIME    HYDR    CORRN   T DEG C     K FCT   L FCT  DIAM  MM       PHI      PCT  FNR
     0.3    43.0     2.0     22.0    0.01312    9.2     0.07959      3.65      79.35
     0.5    39.0     2.0     22.0    0.01312    9.9     0.05838      4.10      71.61
     1.0    35.5     2.0     22.0    0.01312   10.5     0.04251      4.56      64.83
     2.0    31.0     2.0     22.0    0.01312   11.2     0.03106      5.01      56.13
     5.0    26.0     2.0     22.0    0.01312   12.0     0.02033      5.62      46.45
    10.0    24.0     2.0     22.0    0.01312   12.4     0.01481      6.10      42.58
    15.0    22.0     2.0     22.0    0.01312   12.7     0.01207      6.37      38.71
    30.0    19.0     2.0     22.0    0.01312   13.2     0.00870      6.84      32.90
    60.0    16.5     1.5     22.5    0.01304   13.6     0.00621      7.33      29.03
   120.0    14.0     2.0     23.0    0.01297   14.0     0.00443      7.82      23.22
   240.0    12.0     2.0     23.0    0.01297   14.3     0.00317      8.30      19.35
   480.0    10.5     2.0     23.0    0.01297   14.6     0.00226      8.79      16.45
  1440.0     8.5     2.5     21.0    0.01328   14.9     0.0013'      9.53      11.61
------------------ SIEVE RESULTS ------------------

  DIAM  MM    WT  GMS       PHI    PER CENT   PCT  FNR
    2.000        0.07      -1.00      0.13     100.00
    1.000        0.18      -0.0       0.34      99.66
    0.500        0.52       1.00      1.00      98.66
    0.250        1.32       2.00      2.56      96.10
    0.125        3.37       3.00      6.52      89.57
    0.063        7.88       3.99     15.21      74.36
    0.053        1.70       4.24      3.28      71.08
```

```
EL  TIME    HYDR    CORRN   T DEG C     K FCT   L FCT  DIAM  MM       PHI      PCT  FNR
     0.3    50.0     1.5     22.0    0.01312    8.1     0.07488      3.74      83.71
     0.5    47.0     1.5     22.0    0.01312    8.6     0.05441      4.20      78.53
     1.0    43.5     1.5     22.0    0.01312    9.1     0.03966      4.66      72.49
     2.0    39.5     1.5     22.0    0.01312    9.8     0.02904      5.11      65.59
     5.0    34.0     1.5     22.0    0.01312   10.7     0.01919      5.70      56.09
    10.0    31.5     2.0     22.5    0.01304   11.1     0.01377      6.18      50.91
    15.0    29.5     2.0     22.5    0.01304   11.4     0.01140      6.45      47.46
    30.0    27.5     2.0     22.5    0.01304   11.8     0.00818      6.93      44.01
    60.0    25.0     2.0     23.0    0.01297   12.2     0.00586      7.42      39.70
   120.0    23.0     2.0     23.0    0.01297   12.5     0.00419      7.90      36.24
   240.0    21.0     2.0     23.0    0.01297   12.9     0.00301      8.38      32.79
   480.0    20.0     2.0     23.0    0.01297   13.0     0.00213      8.87      31.07
  1440.0    18.0     2.5     21.0    0.01328   13.3     0.00128      9.61      26.75
------------------ SIEVE RESULTS ------------------

  DIAM  MM    WT  GMS       PHI    PER CENT   PCT  FNR
    2.000        0.17      -1.00      0.29     100.00
    1.000        0.18      -0.0       0.30      99.70
    0.500        0.44       1.00      0.76      98.94
    0.250        1.02       2.00      1.76      97.18
    0.125        2.23       3.00      3.85      93.33
    0.063        5.05       3.99      8.71      84.62
    0.053        1.13       4.24      1.95      82.67
```

Table Ap-2: Quantitative and qualitative attributes of projectile points recovered from the Block Excavation

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	NECK WIDTH	THICKNESS	BASAL GRINDING	LATERAL GRINDING	REMARKS	FIGURE
3640	14N 42W SE¼ 0-5	Plains Side-Notched	white S. V. chert	18.3	16.3	11.1	3.4	A	P	complete	21 g
3834	14N 43W NE¼ 0-5	Plains Side-Notched	red shale (siltstone)	21.0*	13.9	8.6	3.8	A	P	one ear missing	21 e
5219	15N 39W NE¼ 0-5	-	crystalline siltstone	32.2*	14.1*	-	4.9	-	-	point preform	
6620	16N 37W SW¼ 0-5	Plains Side-Notched	white S. V. chert	20.0	15.2	9.6	3.5	P	P	one ear missing	21 h
6978	16N 38W NW¼ 0-5	Plains Side-Notched	black pebble chert	19.3	12.5	8.9	3.4	P	P		21 d
2602	14N 36W NE¼ 5-10	-	green pebble chert	10.7*	13.7	-	3.1	-	-	point tip	
2603	14N 36W NE¼ 5-10	-	green pebble chert	13.1*	9.4*	-	2.0*	-	-	point tip	
2604	14N 36W NW¼ 5-10	-	green pebble chert	17.1*	10.7*	-	2.4*	-	-	point tip	
2605	14N 36W NW¼ 5-10	Besant	black banded siltstone	6.5*	12.7	-	3.3*	P	P	point base	21 m
2948	14N 38W SW¼ 5-10	Duncan	crystalline siltstone	33.0	21.2	18.0	5.0	A	A	complete	22 i
3535	14N 41W NE¼ 5-10	Prairie Side-Notched	crystalline siltstone	16.6*	17.8	13.1	5.0*	P	P	point base	21 s
3646	14N 42W SE¼ 5-10	-	crystalline siltstone	37.6*	14.3	7.5	3.8	-	-	notched point tip	
3695	14N 42W SW¼ 5-10	Plains Side-Notched	grey quartzite	10.0*	10.2	6.0	2.9	P	A	reworked	21 f
4265	15N 34W NW¼ 5-10	Plains Side-Notched	black banded siltstone	25.2*	16.6*	11.5	5.1	P	P	broken longitudinally	21 l
4591	15N 36W NE¼ 0-10	-	black banded siltstone	16.0*	12.1*	-	3.0	-	P	point midsection	
5665	15N 41W NE¼ 0-10	Triangular	black banded siltstone	16.3*	17.1*	-	4.5*	-	-	point? fragment	
5871	16N 34W SE¼ 5-10	-	grey chert	15.6	8.6	-	2.4	A	A	point blank?	
6630 6914	16N 37W SW¼ 5-10 16N 38W NE¼ 5-10	Plains Side-Notched	crystalline siltstone	27.1	15.9	9.0	2.8	A	A	articulating fragments	21 k
6631 6791	16N 37W SW¼ 5-10 16N 38W SE¼ 5-10	Plains Side-Notched	crystalline siltstone	22.4	13.6	7.8	2.5	P	A	articulating fragments	21 i
6781	16N 38W SE¼ 5-10	Plains Side-Notched	crystalline siltstone	14.5	11.8	6.7	2.9	P	P	complete	21 c
7670	17N 34W SE¼ 5-10	Plains Side-Notched?	tan quartzite	11.2*	18.0	-	4.7*	P	P	point base	22 b
7841	17N 34W NW¼ 5-10	-	tan quartzite	27.9*	22.8	-	7.6*	A	A	point blank? fragment	
8542	17N 40W SE¼ 5-10	Duncan	grey pebble chert	42.5	20.5	16.9	5.3	P	P	complete	22 h
1377	13N 35W NE¼ 10-15	Oxbow	black banded siltstone	10.4*	25.0*	-	4.9	A	P	point base	27 p
2036	13N 41W NW¼ 10-15	Pelican Lake ?	black chert	23.5	15.4	11.7	5.8	P	P	complete	24 f
2475	14N 35W NW¼ 10-15	-	black banded siltstone	7.0*	8.8*	-	1.7*	-	-	point tip	
2476	14N 35W NW¼ 10-15	Besant?	wine mottled chert	12.9	19.7	13.8	3.8	P	P	reworked into scraper	22 c
2751 2765	14N 37W SW¼ 10-15 14N 37W SW¼ 15-20	Prairie Side-Notched	black banded siltstone	41.2	20.1	11.4	3.5	A	A	in three pieces	24 i
2798	14N 37W NE¼ 10-15	Oxbow?	crystalline siltstone	13.5*	20.2*	12.0	4.6*	A	A	point base	21 t
2957	14N 38W SW¼ 10-15	-	weathered siltstone	25.8*	14.9*	-	3.4*	-	-	point midsection	
3209	14N 39W NW¼ 10-15	Prairie Side-Notched?	black banded siltstone	7.9*	14.5*	9.2	3.2	P	P	point base	24 j
3255	14N 40W SE¼ 10-15	Hanna	crystalline siltstone	18.7*	17.9	10.0	4.8	P	P	point base	21 r

Table Ap-2: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	NECK WIDTH	THICKNESS	BASAL GRINDING	LATERAL GRINDING	REMARKS	FIGURE
3803	14N 42W NW¼ 10-15	-	crystalline siltstone	11.0)	17.0*	-	6.5	-	-	point tip	
4417	15N 35W NE¼ 10-15	Duncan	red quartzite	37.3*	19.7	14.9	6.3	P	P	used as drill	22 l
4735	15N 37W SW¼ 10-15	Oxbow?	black pebble chert	5.0*	12.9*	-	2.5*	P	P	point ear	
4916	15N 38W SE¼ 10-15	Oxbow?	red jasper (chert)	10.5*	13.2*	-	3.1*	A	P	point ear	
6792	16N 38W SE¼ 10-15	Besant	crystalline siltstone	23.2	20.3	14.5	5.8	P	P	reworked	24 h
7030	16N 39W SE¼ 10-15	Duncan	black banded siltstone	25.6	16.6	11.9	5.2	P	P	complete	22 k
7418	16N 41W SW¼ 10-15	Duncan?	black banded siltstone	10.4*	14.6*	13.3	3.7	P	P	point base	
344	13N 36W SW¼ 15-20	Besant	tan quartzite	58.8*	34.0	20.9	10.2	P	P	extreme tip missing	22 g
2573	14N 36W SW¼ 15-20	Duncan	green pebble chert	31.3*	22.1	13.5	5.3	P	P	tip missing	22 j
2624	14N 36W NE¼	-	green pebble chert	23.6*	13.5*	-	2.1*	-	-	point tip	
3099	14N 39W SE¼ 15-20	Oxbow?	crystalline siltstone	8.1*	15.2*	10.7	4.1*	P	P	point base	27 d
4526	15N 36W SE¼ 15-20	Triangular	black siltstone	27.7*	22.9	-	3.7	A	A	point base	
4642	15N 36W NW¼ 15-20	Plains Side-Notched?	grey quartzite	10.5*	20.0*	16.6	5.4*	P	P	point base	22 a
4680	15N 37W SE¼ 15-20	-	black banded siltstone	22.0*	11.1*	-	3.0*	-	-	point tip	
4742	15N 37W SW¼ 15-20	-	weathered siltstone	46.3*	25.4	17.8	5.2	-	-	point blade	
5386	14N 40W SW¼ 15-20	Oxbow	brown pebble chert	27.6	17.7	14.9	6.4	P	A	complete	27 h
5715	15N 41W NW¼ 15-20	Duncan	black banded siltstone	23.7*	19.9*	15.7	4.6*	A	A	point base	22 d
5754	15N 42W SE¼ 15-20	Oxbow?	green pebble chert	7.8*	16.7*	11.5	5.0*	P	P	point base	27 b
5890	16N 34W SE¼ 15-20	Pelican Lake	crystalline siltstone	24.5*	19.3	11.1	4.9	A	P	tip missing	24 e
5963	16N 34W SW¼ 15-20	Triangular	black banded siltstone	15.3*	13.3*	-	3.3	A	A	tip missing	21 b
6117	16N 34W NW¼ 15-20	Oxbow	grey quartzite	10.0*	11.2*	-	3.9*	P	P	base portion	27 a
6574	16N 37W SE¼ 15-20	Oxbow?	grey pebble chert	18.6*	17.0	10.1	4.6	P	P	point base	27 j
6644	16N 37W SW¼ 15-20	-	crystalline siltstone	30.6*	22.0*	-	5.5	-	-	point tip	
6929	16N 38W NE¼ 15-20	Plains Side-Notched	grey banded siltstone	23.4	14.8	8.2	4.1	P	P	base damaged	21 j
7098	16N 39W SW¼ 15-20	Pelican Lake?	green pebble chert	19.9	15.4	9.2	4.1	P	P	complete	
7575	16N 42W NE¼ 15-20	Triangular	wine mottled chert	22.3*	19.2	-	4.9	-	-	point blank	
8420	17N 39W SE¼ 15-20	Prairie Side-Notched?	weathered siltstone	34.8	15.6	10.0	3.9	P	P	complete	24 b
345	13N 36W SW¼ 20-25	-	black banded siltstone	15.9*	16.2*	-	3.9	-	-	point tip	
346	13N 36W SW¼ 20-25	Oxbow	black banded siltstone	20.5*	22.9	18.3	5.2	P	P	point base	27 l
347	13N 36W SW¼ 20-25	Oxbow	dull green siltstone	30.2	19.2	13.0	5.0	P	P	complete	27 o
3056	14N 38W NW¼ 20-25	Prairie Side-Notched?	grey quartzite	23.2*	16.9	11.8	3.9	P	P	complete	24 a
3057	14N 38W NW¼ 20-25	Oxbow	brown chalcedony	21.1*	29.5	23.2	4.2*	P	P	point base	27 n
3303	14N 40W SW¼ 20-25	Besant?	brown petrified wood	18.4*	27.3*	21.2	7.7*	P	A	point base	22 e
3553	14N 41W NE¼ 20-25	Pelican Lake?	black siltstone	31.1	16.1	7.0	3.8	P	P	ears missing	21 q

Table Ap-2: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	NECK WIDTH	THICKNESS	BASAL GRINDING	LATERAL GRINDING	REMARKS	FIGURE
3760	14N 42W NE¼ 20-25	-	crystalline siltstone	13.5*	15.5*	-	2.3*	-	-	point tip	
4335	15N 35W SE¼ 20-25	Pelican Lake?	crystalline siltstone	16.9*	13.6	10.0	3.4	P	P	extreme tip missing	24 c
4822	15N 37W NE¼ 20-25	Mount Albion	grey S. V. chert (chalc.)	13.5	16.4	9.0	4.3	P	P	reworked-end scraper	25 h
5349	15N 40W SE¼ 20-25	Oxbow	black banded siltstone	23.8*	20.5	17.9	3.0	P	P	point base	27 f
5587	15N 41W SE¼ 20-25	Oxbow	crystalline siltstone	7.5*	15.9*	-	3.6*	P	P	point base	24 k
6520	16N 36W NW¼ 20-25	-	crystalline siltstone	7.2*	9.6*	-	2.1*	-	-	point tip	
7640	17N 32W NW¼ 20-25	-	black banded siltstone	21.6*	22.4	-	7.4	A	A	point blank fragment	
3458	14N 41W SE¼ 25-30	Besant?	grey pebble chert	28.0	19.1	13.0	5.0	P	P	complete	25 k
3662	14N 42W SE¼ 25-30	-	green pebble chert	15.3*	18.5*	-	4.0*	-	-	point tip	
5254	15N 39W NE¼ 25-30	Oxbow?	black banded siltstone	19.6*	16.7	9.9	4.9	P	P	tip missing	27 k
3317	14N 40W SW¼ 30-35	Oxbow	grey S. V. chert	16.0*	15.0	13.5	4.4	P	P	point base	27 g
4400	15N 35W SW¼ 30-35	Oxbow?	black banded siltstone	30.7*	35.0*	29.5	4.8*	P	P	hafted biface base	27 q
5106	15N 38W NW¼ 30-35	Oxbow	grey pebble chert	20.0	11.6	8.4	2.8	A	A	on retouched flake	27 i
5922	16N 34W SE¼ 30-35	Agate Basin	weathered tan siltstone	35.2*	25.0*	-	7.8*	P	P	point base	28 e
7014	16N 38W NW¼ 30-35	Duncan?	grey quartzite	7.0*	14.2*	14.4	3.8*	A	-	point base	
7262	16N 40W SE¼ 30-35	Oxbow	wine chalcedony	45.3*	26.1	21.9	6.0	P	P	burnt, tip missing	27 m
3365	14N 40W NE¼ 35-40	Oxbow?	black banded siltstone	18.8*	13.0*	-	3.2	P	A	ear missing	27 e
3570) 3427)	14N 41W NE¼ 35-40) 14N 40W NW¼ 40-45)	Agate Basin	black banded siltstone	37.0*	22.5*	-	6.8	-	P	two base fragments	28 g
4624	15N 36W NE¼ 35-40	Mount Albion	dull green siltstone	7.8*	17.4*	13.5	3.6*	P	P	point base	25 e
5491	15N 40W NE¼ 35-40	Mount Albion	black pebble chert	11.3*	18.2*	14.2	3.6*	P	P	point base	25 f
5654	15N 41W SW¼ 35-40	Mount Albion	grey S. V. chert	10.4*	12.4*	7.8	4.7*	P	P	point base	25 b
7717	17N 34W SE¼ 35-40	Agate Basin	dull green siltstone	40.1	20.3	-	5.9	P	P	complete	28 f
3731	14N 42W SW¼ 40-45	Agate Basin	fine grey siltstone	31.0*	23.1*	-	7.3*	P	P	point base	28 d
4199	15N 34W SW¼ 40-45	-	wine clay ironstone	43.2*	23.8*	-	8.3	-	P	point tip	
4254	15N 34W NE¼ 40-45	-	opaque creamy chert	18.3*	25.3*	-	5.0*	-	-	point or biface tip	25 g
4628	15N 36W NE¼ 40-45	Mount Albion?	grey quartzite	30.5	17.4	9.1	5.1	P	P	complete	25 c
5431	15N 40W SW¼ 40-45	Scottsbluff	dull green siltstone	13.8*	18.2*	-	5.5*	P	P	point base	28 c
5769	15N 42W SE¼ 40-45	Mount Albion	white quartzite	30.1*	19.3	14.2	4.3	P	P	extreme tip missing	25 i
6886	16N 38W SW¼ 40-45	Midland	white S. V. chert	24.2*	22.6*	-	4.8*	P	P	point base	30 a
7078) 7080)	16N 39W SE¼ 40-45 16N 39W SE¼ 45-50)	-	black banded siltstone	18.0*	15.4*	-	4.0*	-	-	point tip	25 d
7229	16N 39W NW¼ 40-45	Fluted Point	crystalline siltstone	25.8	21.0	-	4.1	A	A	complete	28 b
8385	17N 38W NE¼ 40-45	Fluted Point	black pebble chert	20.4*	29.7	-	4.0*	P	P	point base	28 a
4149	15N 34W SE¼ 45-50	-	mottled brown jasper	22.0*	21.3*	-	4.4*	-	-	midsection	25 a

Table Ap-3: Quantiative and qualitative attributes of projectile points recovered from outside the Block Excavation

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	NECK WIDTH	THICKNESS	BASAL GRINDING	LATERAL GRINDING	REMARKS	FIGURE
8702	ca. 84W	Plains Side-Notched	grey pebble chert	18.0	10.9*	5.1	3.0	A	A	from surface of path	23 c
342	13N 30W NE¼ 0-5	Plains Side-Notched	grey chert	16.5	13.2	9.0	2.9	P	A	complete	23 d
2102	13N 44W NW¼ 0-5	Plains Side-Notched	black chert	12.1*	16.7*	9.6	3.2*	P	A	point base	23 i
424	12N 24W SW¼ 15-20	Plains Side-Notched	black chert	11.0*	13.4*	-	1.9*	P	P	point base	23 j
2207	14N 29W NW¼ 0-5	Plains Triangular	black banded siltstone	11.9*	12.0*	-	2.4	P	A	point base	23 n
1332	13N 30W NW¼ 0-10	Plains Triangular	blue-grey chert	15.8	12.5	-	3.0	A	A	complete	23 b
2179	14N 27W NW¼ 0-5	Prairie Side-Notched	dull green siltstone	28.3	18.9	11.9	5.1	P	A	complete	23 m
309	12N 47W SE¼ 10-15	Prairie Side-Notched	opaque grey obsidian	14.8	11.8	8.4	3.4	A	A	reworked	23 l
10	Shovel Test # 1	Besant?	black banded siltstone	24.2*	18.9*	13.8	4.7	P	A	tip & barbs missing	23 o
11	Shovel Test # 1	Besant?	grey chert	23.9*	16.8*	9.6*	3.7	P	P	point base	
2211	14N 29W NW¼ 5-10	Besant?	black banded siltstone	5.1*	1.2*	-	3.6*	P	P	base fragment	23 f
155	14N 30W SE¼ 10-15	Besant	grey quartzite	12.7*	24.1*	20.2	5.2*	P	P	point base	23 g
2270	14N 30W NW¼ 10-15	Besant?	black siltstone	28.7*	19.6*	12.6	5.0	P	A	point base	23 h
1224	13N 24W NW¼ 20-25	Besant?	black banded siltstone	9.1*	17.7*	13.6	5.0*	P	A	point base	23 k
186	14N 30W SW¼ 5-10	Pelican Lake	black banded siltstone	21.0	15.5	8.0	4.2	P	P	complete	26 a
336	12N 36W NW¼ 0-10	Pelican Lake?	black banded siltstone	20.3*	17.5	10.7	4.5	P	P	tip missing	26 c
763	12N 41W SE¼ 10-15	Pelican Lake?	black pebble chert	25.5	19.5	11.0	5.7	P	P	complete	26 d
2152	14N 27W SW¼ 15-20	Pelican Lake?	blue-grey chert	20.5*	21.3	11.2	5.9	P	A	point base	26 b
752	12N 36W NW¼ 20-25	Pelican Lake?	crystalline siltstone	13.7*	13.9*	-	4.4*	-	P	base fragment	26 f
954	12N 48W NW¼ 25-30	Pelican Lake?	grey chert (chalced.)	20.1	17.9	10.2	4.7	P	P	complete	26 e
39	12N 24W NE¼ 5-10	Duncan	black banded siltstone	34.4	20.7	17.2	5.2	P	P	complete	
82	12N 24W NW¼ 5-10	Duncan	grey quartzite	11.6*	11.8	9.8	5.0*	A	A	point base	23 a
352	12N 24W SE¼ 0-5	Oxbow	wine chert	17.3*	15.3*	-	5.0	P	P	base fragment	26 j
682	12N 36W SW¼ 10-15	Oxbow?	crystalline siltstone	12.2*	15.5*	11.9	4.7	P	P	point base	26 k

Table Ap-3: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	NECK WIDTH	THICKNESS	BASAL GRINDING	LATERAL GRINDING	REMARKS	FIGURE
1193	13N 24W NW¼ 10-15	Oxbow	crystalline siltstone	23.7	21.1	16.3	5.6	P	P	complete	26 h
2244	14N 30W NE¼ 10-15	Oxbow	dark grey siltstone	46.8*	19.5*	11.5	5.1	P	P	broken longitudinally	26 l
83	12N 24W NW¼ 15-20	Oxbow	crystalline siltstone	23.8*	23.2	14.5	5.3	P	A	reworked	26 i
1309	13N 30W SW¼ 15-20	Oxbow	blue-grey chert	24.0*	20.0	14.6	5.1	P	P	point base	26 g
970	12N 48W NW¼ 35-40	Mount Albion	crystalline siltstone	14.5*	13.2	10.0	4.6*	P	P	point base	23 q
4058	15N 32W NE¼ 35-40	Mount Albion	black pebble chert	29.1	16.3	12.0	5.0	P	P	complete	23 p
12	Shovel Test # 1	-	grey chert	8.5*	13.4*	-	3.2*	-	-	point tip	
1283	13N 20W SW¼ 0-5	-	crystalline siltstone	16.1*	14.3*	-	4.0*	-	-	point tip	
2180	14N 27W NW¼ 0-5	-	tan siltstone	17.5*	14.6*	-	2.9*	-	-	point tip	
141	14N 30W SE¼ 0-5	-	crystalline siltstone	8.2*	10.6*	-	2.3*	-	-	point tip	
341	11N 30W NW¼ 5-10	-	crystalline siltstone	18.6*	17.3*	-	5.5	A	A	point reject?	
2210	14N 29W NW¼ 5-10	Notched	grey quartzite	17.3*	14.8*	-	3.1	-	-	point blade	
563	12N 32W NE¼ 10-15	-	crystalline siltstone	8.8*	14.3*	-	3.3*	-	-	point tip	
791	12N 41W SW¼ 10-15	-	dull green siltstone	29.1*	20.6*	-	3.1*	-	-	point tip	
1194	13N 24W NW¼ 10-15	-	black siltstone	12.0*	20.3*	-	5.0*	-	-	point midsection	
423	12N 24W SW¼ 15-20	-	grey pebble chert	18.3*	16.6*	-	4.0*	-	-	point tip	
1210	13N 24W NW¼ 15-20	-	wine chert	9.9*	10.5*	-	2.0*	-	-	point tip	
4072	15N 32W NW¼ 15-20	-	grey quartzite	18.2*	19.2*	-	4.8*	-	-	point tip	
1181	13N 24W NE¼ 20-25	-	tan siltstone	12.5*	19.7*	-	4.4*	-	-	point tip	
1322	13N 30W SW¼ 20-25	-	crystalline siltstone	26.4*	22.5*	-	7.7*	-	-	point tip	
175	14N 30W SE¼ 20-25	Notched	crystalline siltstone	20.4*	19.1*	-	6.0	-	-	point blade	
350	14N 30W SW¼ 20-25	-	brown chert	8.5*	13.4*	-	4.0*	-	-	point tip	
4055	15N 32W NE¼ 35-40	-	dark grey chert	12.6*	13.5*	-	4.2*	-	-	point tip	

Table Ap-4: Quantitative and qualitative attributes of bifaces from the Block Excavation

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	REMARKS	FIGURE
2518) 2600)	14N 36W SE¼ 5-10 14N 36W NE¼ 5-10	triangular	yellow-wine chalcedony	43.4	30.5	5.1	found in 3 articulating pieces	31 d
2519	14N 36W SE¼ 5-10	-	yellow-wine chalcedony	21.0*	17.4*	4.0*	biface tip	31 c
2520	14N 36W SE¼ 5-10	-	yellow-wine chalcedony	25.9*	6.4*	6.1*	biface fragment	
2521	14N 36W SE¼ 5-10	-	yellow-wine chalcedony	14.6*	8.4*	3.4*	biface fragment	
3332	14N 40W NE¼ 5-10	tear drop	fine tan sandstone	64.0*	45.9	8.5	evidence of wear	31 f
2601	14N 36W NE¼ 5-10	-	yellow-wine chalcedony	19.0*	14.6*	3.2*	biface tip	31 b
5131	15N 39W SE¼ 5-10	tear drop	crystalline siltstone	31.0	23.8	8.3	point preform?	
5707	15N 41W NW¼ 5-10	triangular	black banded siltstone	49.4*	26.6	5.6	two articulating fragments	31 h
7339	16N 40W NE¼ 5-10	-	grey siltstone	49.0*	38.8*	10.6*	biface tip	31 a
7447	16N 41W SW¼ 5-10	triangular	crystalline siltstone	46.9	26.6	13.9	crude biface	31 e
7477	16N 41W NE¼ 5-10	-	black banded siltstone	14.0*	15.7*	5.9*	biface fragment	
8271	17N 38W SE¼ 5-10	bipointed	petrified wood	62.3	28.0	10.0		31 i
1378	13N 35W NE¼ 10-15	-	grey banded siltstone	26.8*	29.6*	7.3*	biface fragment	
1537	13N 39W SE¼ 10-15	-	crystalline siltstone	7.2*	10.9*	2.5	biface fragment	
2037	13N 41W NW¼ 10-15	tear drop	crystalline siltstone	40.9	28.1	11.4		
2320	14N 35W SE¼ 10-15	oval	black siltstone	40.1*	27.7*	9.1		33 f
2321	14N 35W SE¼ 10-15	-	crystalline siltstone	22.7*	19.2*	8.0*	biface fragment	
2753	14N 37W SW¼ 10-15	oval	wine quartzite	104.5	52.8	16.5	shows signs of use wear	32 a
4097	15N 43W SE¼ 10-15	oval	crystalline siltstone	60.0*	37.1*	12.4*	shows signs of moderate wear	31 g
4218	15N 34W NE¼ 10-15	-	crystalline siltstone	22.8*	17.8*	11.4*	biface fragment	
4419	15N 35W NE¼ 10-15	-	grey quartzite	21.4*	35.6*	9.5*	biface fragment	
5845	15N 42W NW¼ 10-15	-	crystalline siltstone	40.9*	56.8*	10.2*	fragment show moderate use	32 c
6260	16N 35W NE¼ 10-15	-	tan quartzite	32.6*	42.9	14.5*	fragment shows signs of wear	
7347	16N 40W NE¼ 10-15	-	black banded siltstone	25.0*	11.2*	5.1*	biface fragment	
1424	13N 35W NW¼ 15-20	triangular	black banded siltstone	32.1	23.5	7.8		
1462	13N 36W SE¼ 15-20	-	grey quartzite	36.8*	33.6*	10.3*	biface tip	
1750	13N 40W SW¼ 15-20	tear drop	fine grey quartzite	38.0	28.6	11.1		33 c
3012	14N 38W NE¼ 15-20	rectangular	crystalline siltstone	62.4	53.8	15.2		32 d
3219	14N 39W NW¼ 15-20	-	black banded siltstone	21.9*	24.8*	5.2*	biface tip, shows signs of use	33 a
3544	14N 41W NE¼ 15-20	-	black banded siltstone	10.9*	29.2*	6.5*	biface fragment	
4543	15N 36W SW¼ 15-20	tear drop	crystalline siltstone	26.8*	25.5*	6.0*		33 b
4806	15N 37W NE¼ 15-20	-	grey quartzite	41.6*	33.0*	10.2*	biface fragment, edge wear present	
5087	15N 38W NW¼ 15-20	-	grey quartzite	33.8*	36.2*	12.1	biface fragment	
5679	15N 41W NE¼ 15-20	-	crystalline siltstone	27.8*	38.8*	8.7*	biface fragment	
5964	16N 34W SW¼ 15-20	-	crystalline siltstone	57.6*	49.5*	13.3*	biface tip	32 b
8276	17N 38W SE¼ 15-20	parallel-sided	crystalline siltstone	50.5	15.1	6.7		33 g
255) 695)	13N 36W NW¼ 20-25 12N 36W SW¼ 15-20	oval	grey quartzite	68.7	37.8	7.4	two articulating pieces	
2388	14N 35W SW¼ 20-25	rectangular	green siltstone	49.1	46.9	19.0		
4927 3195 3142	15N 38W SE¼ 15-20 14N 39W NE¼ 20-25 14N 39W NW¼ 20-25	hafted biface	black banded siltstone	74.1	44.5	7.2	reconstructed from three fragments	35 a

Table Ap-4: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	REMARKS	FIGURE
3304	14N 40W SW¼ 20-25	-	crystalline siltstone	37.0*	43.4*	14.2	biface tip	
4285	15N 34W NW¼ 20-25	oval	crystalline siltstone	49.5	32.0	13.3		
4880	15N 37W NW¼ 20-25	tear drop	mottled tan chalcedony	70.0	46.4	8.6		35 b
5471	15N 40W NE¼ 20-25	-	black banded siltstone	29.3*	35.7*	9.2*	biface fragment	
6514	16N 36W NW¼ 20-25	-	black banded siltstone	52.8*	21.0*	9.0*	biface edge fragment	
7000	16N 38W NW¼ 20-25	oval	grey quartzite	91.0	53.2	14.6	shows signs of heavy use	34 c
7047	16N 39W SE¼ 20-25	-	crystalline siltstone	20.5*	30.6*	8.4*	bifzce fragment	
8280	17N 38W SE¼ 20-25	oval	crystalline siltstone	99.1	72.4	30.4	very crude biface	
1673	13N 39W NW¼ 25-30	oval	crystalline siltstone	51.9	35.4	10.0	only one edge retouched	
3459	14N 41W SW¼ 25-30	-	black banded siltstone	44.7*	31.3*	9.6*	some edge wear	
5530	15N 40W NW¼ 25-30	-	black banded siltstone	20.2*	14.6*	3.5*	may be point or drill fragment	
5856	15N 42W NW¼ 25-30	oval	grey quartzite	90.1	45.4	15.7	moderate edge wear	34 a
6072	16N 34W NE¼ 25-30	-	tan quartzite	85.1*	48.8*	9.8*		34 b
8584	17N 40W SW¼ 25-30	triangular	crystalline siltstone	25.1*	10.9*	6.3*	some edge wear	
3118	14N 39W SE¼ 30-35	-	grey quartzite	52.0*	47.2*	12.2*	biface tip	
3466	14N 41W SE¼ 30-35	tear drop	black banded siltstone	30.1	19.6	6.0		
3563	14N 41W NE¼ 30-35	-	crystalline siltstone	29.3*	30.9*	9.2*	biface tip	
4126	15N 34W SE¼ 30-35	-	black banded siltstone	43.7*	30.4*	7.9*	biface tip	
5107	15N 38W NW¼ 30-35	oval	black banded siltstone	63.4	45.0	17.2		
4400	15N 35W SW¼ 30-35	hafted biface	black banded siltstone	30.7*	35.0*	4.8*	base of hafted biface	
5832	15N 42W NE¼ 30-35	oval	wine quartzite	60.9	30.8	10.0		
6294	16N 35W NE¼ 30-35	-	crystalline siltstone	56.4	37.8	24.1	very crude (reject?)	
7706	17N 34W SE¼ 30-35	-	grey quartzite	38.9*	26.1*	6.4*	biface fragment	
2061	13N 41W NW¼ 35-40	-	crystalline siltstone	50.4*	23.0*	10.2*	biface fragment	
3520	14N 41W SW¼ 35-40	-	crystalline siltstone	39.6*	42.1*	14.6*	very crude fragment	
5011	15N 38W SW¼ 35-40	oval	crystalline siltstone	79.4	50.7	20.2		36 c
5210	15N 39W SW¼ 35-40	oval	crystalline siltstone	56.1	40.8	10.8		36 b
6091	16N 34W NE¼ 35-40	triangular	crystalline siltstone	71.6	58.0	30.1	slight edge wear	
7777	17N 34W SW¼ 35-40	-	black banded siltstone	33.7*	9.0*	9.6*	biface fragment	
3680	14N 42W SE¼ 40-45	oval	crystalline siltstone	80.3	48.0	13.9	slight edge wear	36 a
2940	14N 38W SE¼ 40-45	-	pink chalcedony	19.3*	18.4*	3.5*	biface fragment	
5939	16N 34W SE¼ 40-45	oval	crystalline siltstone	53.6	40.6	14.7		
7877	17N 34W NW¼ 40-45	-	grey quartzite	5.6*	11.3*	3.6*	biface fragment	
7884	17N 34W NW¼ 40-45	oval	crystalline siltstone	53.7	30.9	15.0		
7960	17N 35W SW¼ 40-45	oval	grey quartzite	90.0	72.9	45.5	moderate wear present	37 a
7081	16N 39W SE¼ 45-50	-	crystalline siltstone	43.7*	37.5*	11.1	biface tip	
8005	17N 35W NE¼ 45-50	-	grey chert	22.8*	20.0*	7.3*	biface fragment	

Table Ap-5: Quantitative and qualitative attributes of gravers from EgPr-2

CAT. NO.	PROVENIENCE	MATERIAL	LENGTH	WIDTH	THICKNESS	TIP LENGTH	PLACEMENT	FIGURE	REMARKS
1251	13N 27W NE¼ 20-25	dull green pebble chert	26.5	17.9	4.9	3.7	left dorsal	41 k	Fine retouch on right and left lateral edges.
5757	15N 42W SE¼ 20-25	opaque brown chalcedony	21.5	19.3	3.6	2.1	right distal	41 g	Fine use retouch present along right lateral edge.
6125	16N 34W NW¼ 20-25	dull green pebble chert	29.7	17.6	4.6	0.3	right distal	-	Fine retouch along right lateral edge. Graver spur may be accidental.
810	12N 41W SW¼ 25-30	mottled grey chert (burnt)	23.7	24.9	7.3	1.0	left edge	41 s	Retouching only along left lateral edge.
7463	16N 41W SW¼ 25-30	dull green siltstone	24.7	13.7	2.7	2.9	distal end	41 h	Smoothing present along dorsal ridge. No lateral edge retouching.
1919	13N 41W SE¼ 30-35	grey banded siltstone	34.9	24.6	6.1	3.1	distal end	41 i	Lateral edges both retouched. Dorsal ridge shows smoothing.
5483	15N 40W NE¼ 30-35	dull greeb pebblec chert	39.2	30.5	5.5	2.5	right distal	41 n	Retouched along lateral edges, but little along distal edge.
7319	16N 40W SW¼ 30-35	dull green pebble chert	25.6	20.0	3.4	1.3	distal end	41 m	Retouched along left lateral and along basal corner.
3320	14N 40W SW¼ 35-40	black banded siltstone	10.0*	14.7*	1.8*	3.3	right distal	41 r	Both lateral edges appear to have been retouched.
5489	15N 40W NE¼ 35-40	dull green pebble chert	23.0	15.5	2.9	1.8	left lateral	41 p	One prominent spur and several small notches. Right lateral edge is retouched.
4576	15N 36W SW¼ 35-40	dull green pebble chert	20.2	16.8	2.8	0.5 1.0	right lateral left lateral	41 o	Use retouch is evident along the right lateral and distal edges.
8128	17N 36W NE¼ 35-40	crystalline siltstone	25.8	22.1	7.3	1.6	left lateral	41 l	Edge is retouched on both sides away from the spur.
3525	14N 41W SW¼ 40-45	pink-grey chert	29.2	13.2	3.2	3.1	left distal	41 j	Retouched along both left lateral and distal edges. Use retouch present along right lateral edge.
4967	15N 38W SE¼ 40-45	black quartzite	41.1	21.9	5.2	2.8	distal end	41 e	Retouched along right lateral edge.
7530	16N 41W NW¼ 40-45	black quartzite	27.5	20.0	3.1	1.2 0.9	right distal left distal	41 f	Retouched along left lateral edge.

Table Ap-6: Quantitative and qualitative attributes of retouched flakes from the Block Excavation

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
1368) 1372)	13N 35W NE¼ 0-5 13N 35W NE¼ 5-10	4	dark grey pebble chert	27.9	29.2	3.4	24.2 3.9	rt. lateral distal	47		
2902	14N 38W SE¼ 0-5	-	black banded siltstone	7.7*	11.9*	2.5*	6.7*	distal	45		fragment of retouched flake
3331	14N 40W NE½ 0-5	3	grey quartzite	41.8	37.5	13.2	40.3	lt. lateral	62		wear on rt. lateral edge
3686	14N 42W SW¼ 0-5	1	crystalline siltstone	28.5	24.4	3.7	23.3	rt. lateral	56		slight retouch on distal end
3836	14N 43W NE¼ 0-5	-	grey chert	13.0	17.5	4.3	17.6	distal	73		may be end scraper fragment
4316	15N 35W SE¼ 0-5	1	dull grey siltstone	17.4	15.8	2.2	15.2	rt. lateral	59		
5454	15N 40W NE¼ 0-5	2	crystalline siltstone	19.2	22.6	5.3	14.8	lt. lateral	63		
1528	13N 39W SE¼ 0-10	1	wine chalcedony	16.2	11.2	3.2	15.3	lt. lateral	65		wear on rt. lateral edge
1568	13N 39W SW¼ 5-10	1	black banded siltstone	37.4	27.0	5.0	28.1	rt. lateral	52	44 i	
1785	13N 40W NE¼ 5-10	4	grey siltstone	21.9	24.0	6.4	20.7	distal	48		lateral edges utilized
1826	13N 40W NW¼ 5-10	-	transl. grey chalcedony	9.2	6.9	3.1	10.5 4.2	rt. lateral lt. lateral			bifacial retouching
1934	13N 41W SW¼ 5-10	1	purple quartzite	19.6	20.5	4.3	18.1	rt. lateral	59	44 b	
1987	13N 41W NE¼ 5-10	1	black banded siltstone	28.3	17.4	7.4	12.0	rt. lateral	50		
2031	13N 41W NW¼ 5-10	4	black banded siltstone	27.3	30.4	5.8	19.0	distal	52		use retouch
2360	14N 35W SW¼ 5-10	4	black pebble chert	16.0	23.5	4.6	15.1	distal	62		
2467	14N 35W NW¼ 5-10	5	crystalline siltstone	29.2	27.9	9.5	19.5	rt. lateral	48		ventral retouch
2613	14N 36W NE¼ 5-10	1	blue-grey chert	29.7	24.5	2.5	31.1	rt. lateral	42		
2656	14N 36W NW¼ 5-10	-	black banded siltstone	22.1	15.5	3.8	11.0		30		possile point preform
2851	14N 37W NW¼ 5-10	-	black siltstone	8.2	7.1	1.5	8.2	lateral	58		
2904	14N 38W SE¼ 5-10	4	brown pebble chert	23.8	25.5	3.2	21.5	distal	40		concave retouch
2949	14N 38W SW¼ 5-10	1	grey siltstone	29.1	22.4	4.8	28.9	rt. lateral	44		
2950	14N 38W SW¼ 5-10	1	black banded siltstone	29.5	21.6	3.9	18.3	rt. lateral	54	44 f	
2996	14N 38W NE¼ 5-10	2	dull wine chert	18.1	17.0	9.1	19.8	lt. lateral	60		
3168	14N 39W NE¼ 5-10	2	grey quartzite	41.8	18.9	7.6	38.9	lt. lateral	38	44 c	
3169	14N 39W NE¼ 5-10	2	black banded siltstone	26.6	22.3	3.2	20.2	lt. lateral	42	44 e	
3378	14N 40W NW¼ 5-10	-	petrified wood	24.2	20.9	4.2	12.9		46		
3795	14N 42W NW¼ 5-10	4	crystalline siltstone	36.0	62.1	14.1	47.3	distal	68	44 j	bifacially retouched
4091	15N 34W SE¼ 5-10	5	crystalline siltstone	25.5	18.9	6.2	21.8 12.8	rt. lateral lt. lateral	85 48		
4158	15N 34W SW¼ 5-10	1	translucent quartzite	32.2	28.2	8.3	30.5	rt. lateral	62	44 a	
4266	15N 34W NW¼ 5-10	2	black banded siltstone	27.9	10.9	8.8	26.3	lt. lateral	48		biface? fragment
4463	15N 35W NW¼ 5-10	1	grey pebble chert	23.4	32.7	4.2	19.5	rt. lateral	52	44 h	
4728	15N 37W SW¼ 5-10	2	dark brown chert	27.9	23.9	4.4	22.4	lt. lateral	45		
5181	15N 39W SW¼ 5-10	4	black banded siltstone	22.7	16.2	2.0	16.4	distal	60		
5947	16N 34W SE¼ 5-10	4	grey quartzite	50.1	57.2	9.7	41.4	distal	72	44 d	
6029	16N 34W NE¼ 5-10	-	black banded siltstone	29.0	13.7	8.0	20.0	lt. lateral	64		ventral retouch
6351	16N 36W SE¼ 5-10	3	transl. grey quartzite	30.1	26.6	4.5	28.7 25.5	rt. lateral lt. lateral	58 47		

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
6557	16N 37W SE¼ 5-10	-	transl. grey chalcedony	16.0	7.7	4.1	15.8	-	65		bifacial retouch
6628	16N 37W SW¼ 5-10	1	dark grey siltstone	32.2	33.6	7.8	34.0	rt. lateral	56	44 g	
6744	16N 37W NW¼ 5-10	1	crystalline siltstone	33.2	12.0	11.8	30.9	rt. lateral	57		spall from bipolar core
7294	16N 40W SW¼ 5-10	2	dull green siltstone	23.5	28.1	4.6	22.9 28.0	rt. lateral lt. lateral	38		
1416	13N 35W NW¼ 10-15	2	dull green pebble chert	29.2	26.9	3.7	15.2	lt. lateral	47	45 d	
1536	13N 39W SE¼ 10-15	2	grey pebble chert	12.5	14.6	3.0	11.3	lt. lateral	75		
1607	13N 39W NE¼ 10-15	1	mottled grey-red chert	18.7	26.1	3.2	19.8	rt. lateral	44	45 a	
1608	13N 39W NE¼ 10-15	3	crystalline siltstone	12.7	11.3	2.5	13.0 9.3	rt. lateral lt. lateral	40 63		
1834	13N 40W NW¼ 10-15	2	black siltstone	25.0	32.0	4.2	25.4	lt. lateral	45		
2319	14N 35W SE¼ 10-15	3	black banded siltstone	38.2	27.4	6.1	34.4 33.3	rt. lateral lt. lateral	42 47		
2478	14N 35W NW¼ 10-15	2	black banded siltstone	40.0	28.6	6.4	22.9	lt. lateral	50	45 m	
2563	14N 36W SW¼ 10-15	1	grey siltstone	36.5	24.9	4.5	30.9	rt. lateral	41	45 i	
2752	14N 37W SW¼ 10-15	2	crystalline siltstone	40.6	34.0	8.9	13.6	lt. lateral	49		
2799	14N 37W NE¼ 10-15	3	grey chalcedony	25.7	13.3	2.7	24.3 18.2	rt. lateral lt. lateral	55 63	45 k	
2857	14N 37W NW¼ 10-15	2	crystalline siltstone	54.3	27.0	5.3	36.1	lt. lateral	23		
3002	14N 38W NE¼ 10-15	4	black pebble chert	29.7	25.2	4.5	10.7 20.4	lt. lateral distal	56 62	45 c	
3003	14N 38W NE¼ 10-15	2	black banded siltstone	24.1	12.8	2.9	10.8	lt. lateral	46		
3176	14N 39W NE¼ 10-15	2	crystalline siltstone	37.2	27.6	3.7	26.5	lt. lateral	42		use retouched
3746	14N 42W NE¼ 10-15	5	black banded siltstone	23.7	19.1	5.2	23.2	rt. lateral	72		ventral retouch
3751	14N 42W NE¼ 10-15	-	crystalline siltstone	16.9	12.8	4.9	5.6	lt. lateral	58		ventral retouch
3802	14N 42W NW¼ 10-15	1	dull green siltstone	21.0	22.9	3.9	21.4	rt. lateral	54		
4064	15N 32W NW¼ 10-15	1	grey quartzite	20.9	23.7	9.6	15.7	rt. lateral	59		
4471	15N 35W NW¼ 10-15	1	crystalline siltstone	14.6	20.8	9.5	13.8	rt. lateral	42		bifacial retouch
4515	15N 36W SE¼ 10-15	3	wine chalcedony	29.4	16.4	5.2	28.7 20.0	rt. lateral lt. lateral	64 64	45 b	
4516	15N 36W SE¼ 10-15	1	black banded siltstone	12.9	4.1	3.6	12.3	rt. lateral	57		
4797	15N 37W NE¼ 10-15	1	wine chalcedony	20.0	19.5	2.2	18.6	rt. lateral	45	45 j	articulates with 4808, 2850
6308	16N 35W NW¼ 10-15	1	black banded siltstone	24.2	35.9	5.9	19.8	rt. lateral	66	45 h	
6567	16N 37W SE¼ 10-15	2	crystalline siltstone	49.9	16.8	7.4	25.5	lt. lateral	53		
6851	16N 38W SW¼ 10-15	1	crystalline siltstone	49.1	28.8	13.2	21.1	rt. lateral	70		use retouch ?
7031	16N 39W SE¼ 10-15	5	dull green siltstone	38.8	23.1	3.5	26.8	lt. lateral ventral	53	45 f	
7153	16N 39W NE¼ 10-15	3	black banded siltstone	29.3	18.6	5.5	24.9 28.3	rt. lateral lt. lateral	62 65	45 g	
7677	17N 34W SE¼ 10-15	1	tan chert	25.6	18.2	5.6	30.5	rt. lateral	62		
8200	17N 37W SW¼ 10-15	1	grey pebble chert	24.3	19.1	3.0	19.7	rt. lateral	40	45 e	

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EGDE ANGLE	FIGURE	REMARKS
8598	17N 40W NE¼ 10-15	-	grey quartzite	11.8	27.1	8.1	17.8		55		
1423	13N 35W NW¼ 15-20	1	black banded siltstone	26.9	23.2	3.1	19.5	rt. lateral	42		
1655	13N 39W NW¼ 15-20	5	grey chalcedony	23.9	19.3	6.3	14.3	lt. lateral	71		ventral retouch
1656	13N 39W NW¼ 15-20	3	black banded siltstone	40.5	27.0	10.8	40.9 39.7	rt. lateral lt. lateral	62 67		
1999	13N 41W NE¼ 15-20	3	grey siltstone	52.2	22.5	6.6	41.3 37.5	rt. lateral lt. lateral	55 42	47 h	blade-like flake (pseudo blade)
2048	13N 41W NW¼ 15-20	1	black banded siltstone	31.4	17.4	2.7	24.7	rt. lateral	42		
2438	14N 35W NE¼ 15-20	3	black banded siltstone	38.9	24.0	4.4	20.3 23.7	rt. lateral lt. lateral		46 h	
2485	14N 35W NW¼ 15-20	4	opaque brown chalcedony	23.3	17.0	2.1	15.1	distal	54		
2574	14N 36W SW¼ 15-20	1	black banded siltstone	20.5	25.0	5.1	21.9	rt. lateral	58		
2672	14N 36W NW¼ 15-20	2	black pebble chert	25.6	29.9	16.2	18.7	lt. lateral	70	46 c	
2712	14N 37W SE¼ 15-20	4	mottled tan quartzite	62.6	42.5	13.9	38.5	distal	65	47 e	
2724	14N 37W SE¼ 15-20	5	green pebble chert	24.0	21.7	6.6	18.0	rt. lateral	43		ventral retouch
2766	14N 37W SW¼ 15-20	4	black pebble chert	21.9	17.9	3.4	16.3 11.3	lt. lateral distal	42 58		
2812	14N 37W NE¼ 15-20	3	black banded siltstone	18.2	20.6	3.7	14.5 15.9	rt. lateral lt. lateral	35 55		
2864	14N 37W NW¼ 15-20	2	crystalline siltstone	85.1	42.6	21.8	81.1	lt. lateral	78	46 j	
2865	14N 37W NW¼ 15-20	-	crystalline siltstone	25.8	25.0	6.0	22.3		50		
2966	14N 38W SW¼ 15-20	1	smoky chalcedony	16.2	13.1	2.2	14.2	rt. lateral	53		
3217	14N 39W NW¼ 15-20	-	dark grey pebble chert	46.0	14.1	3.9	44.2 42.0	rt. lateral lt. lateral	64 47	47 g	bifacial retouch
3543	14N 41w NE¼ 15-20	3	grey pebble chert	38.4	20.5	3.8	24.9 29.5	rt. lateral lt. lateral	54 53	47 b	
3599	14N 41W NW¼ 15-20	5	black banded siltstone	11.4	17.6	4.6	10.6	rt. lateral	61		
3754	14N 42W NE¼ 15-20	4	crystalline siltstone	16.4	18.7	3.2	10.1 10.0	lt. lateral distal	42 65		
4327	15N 35W SE¼ 15-20	1	banded grey chert	15.9	16.7	3.5	12.0	rt. lateral	51		
4375	15N 35W SW¼ 15-20	3	crystal quartz	40.6	27.2	6.0	31.5 29.2	rt. lateral lt. lateral	62 47	47 f	
4544	15N 36W SW¼ 15-20	1	grey quartzite	36.2	27.9	8.3	24.7 28.1	rt. lateral lt. lateral	58 53	46 e	
4640	15N 36W NW¼ 15-20	1	dark grey pebble chert	31.2	34.0	9.7	22.8	rt. lateral	63	46 f	
4641	15N 36W NW¼ 15-20	1	grey banded siltstone	34.5	34.9	5.1	26.8	rt. lateral	50		
4643	15N 36W NW¼ 15-20	2	grey pebble chert	24.8	14.7	2.1	14.5	lt. lateral	63		

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
4644	15N 36W NW¼ 15-20	2	crystalline siltstone	36.2	21.4	8.6	28.3	lt. lateral	62		
4679	15N 37W SE¼ 15-20	3	opaque brown chert	40.5	23.2	7.9	22.3 33.7	rt. lateral lt. lateral	65 54	46 a	
4807	15N 37W NE¼ 15-20	1	black banded siltstone	24.1	14.4	3.4	23.2	rt. lateral	48	46 b	
4809	15N 37W NE¼ 15-20	1	black banded siltstone	16.7	14.9	4.8	16.2	rt. lateral	70		
4983	15N 38W SW¼ 15-20	4	black banded siltstone	33.0	18.8	2.8	29.0 18.2 30.0	rt. lateral distal lt. lateral	72 54 65	47 d	
5042	15N 38W NE¼ 15-20	1	crystalline siltstone	20.7	13.9	2.9	15.0	rt. lateral	52		utilize retouch
5818	15N 42W NE¼ 15-20	5	mottle cream chert	20.7	26.9	3.5	21.0	lt. lateral	48	47 a	ventral retouch
6054	16N 34W NE¼ 15-20	2	black banded siltstone	23.2	21.2	2.9	12.9	lt. lateral	52		
6363	16N 36W SE¼ 15-20	1	black banded siltstone	30.8	29.0	7.8	25.4	rt. lateral	47		
6503	16N 36W NW¼ 15-20	7	black pebble chert	27.5	16.1	2.8	24.7 19.1	rt. lateral lt. lateral	41 55	46 d	on split pebble
6575	16N 37W SE¼ 15-20	1	grey pebble chert	4.9	10.0	1.5	3.1	rt. lateral	58		
6645	16N 37W SW¼ 15-20	2	crystalline siltstone	29.6	25.4	4.3	9.4 22.1	rt. lateral lt. lateral	34	47 c	right lateral utilized
6800	16N 38W SE¼ 15-20	2	dark grey pebble chert	38.1	14.9	5.6	34.4	lt. lateral	71		
7038	16N 39W SE¼ 15-20	6	tan siltstone	29.5	19.7	4.6	18.2 12.2	rt. lateral lt. lateral	44 61		
7099	16N 39W SW¼ 15-20	1	black banded siltstone	45.8	43.6	14.1	15.4	rt. lateral	56		
7100	16N 39W SW¼ 15-20	1	black banded siltstone	46.9	14.9	8.0	17.0	rt. lateral	52		
7101	16N 39W SW¼ 15-20	2	black banded siltstone	33.2	26.0	2.9	21.5	lt. lateral	61	46 i	
7161	16N 39W NE¼ 15-20	3	black banded siltstone	29.4	26.8	3.7	22.2 20.5	rt. lateral lt. lateral	52 48		
7211	16N 39W NW¼ 15-20	2	black banded siltstone	25.1	20.2	4.6	8.5	lt. lateral	54		use retouch
8574	17N 40W SW¼ 15-20	3	mottled grey-wine chert	23.7	16.6	4.5	18.0 15.6	rt. lateral lt. lateral	52 69		
8082	17N 36W SW¼ 15-20	1	black banded siltstone	43.8	30.8	5.9	19.7	rt. lateral	57	46 g	
1470	13N 36W SE¼ 20-25	3	black banded siltstone	11.0	14.0	2.8	6.2 6.5	rt. lateral lt. lateral	54 47		
1504	13N 36W NE¼ 20-25	7	black pebble chert	30.4	35.9	4.6	13.9 31.9	rt. lateral distal	57 58	48 d	ventral retouch
1665	13N 39W NW¼ 20-25	3	opaque brown chalcedony	22.1	27.9	2.8	23.9 5.0	rt. lateral lt. lateral	58 52		
1952	13N 41W SW¼ 20-25	-	dark brown chalcedony	17.0	9.5	2.4	6.6 14.9	basal rt. lateral	66 62		
6124	16N 34W NW¼ 20-25	7	dark grey pebble chert	27.2	20.9	4.2	27.8 23.0	rt. lateral lt. lateral	58 62	48 f	split pebble
2446	14N 35W NE¼ 20-25	6	black banded siltstone	25.0	32.5	6.5	20.5 29.9	lt. lateral distal	56 65	48 k	
2492	14N 35W NW¼ 20-25	-	dull green pebble chert	25.7	21.5	5.3	26.9 21.8	lt. lateral lt. lateral	62 43		bifacial retouch
2774	14N 37W SW¼ 20-25	2	orange S. V. chert	17.4	13.5	2.1	14.8	lt. lateral	35	48 a	

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
2822	14N 37W NE¼ 20-25	1	crystalline siltstone	15.6	12.1	2.2	12.9	rt. lateral	59		
3224	14N 39W NW¼ 20-25	5	dull green pebble chert	28.1	23.2	2.7	14.9	lt. lateral	62		ventral retouch
3400	14N 40W NW¼ 20-25	-	grey quartzite	7.4	13.2	1.9	12.4	distal?	43		
3494	14N 41W SW¼ 20-25	3	pink quartzite	35.5	35.2	4.6	28.2 32.1	rt. lateral lt. lateral	46 54	48 l	
3656	14N 42W SE¼ 20-25	2	black banded siltstone	40.4	13.0	5.5	39.4	lt. lateral	54		
4108	15N 34W SE¼ 20-25	6	grey quartzite	32.7	40.8	6.5	21.5 23.9	lt. lateral lt. lateral	61 53	48 h	ventral retouch dorsal retouch
4336	15N 35W SE¼ 20-25	4	weathered grey siltstone	28.5	52.2	6.7	34.9	distal	47	48 c	
4604	15N 36W NE¼ 20-25	1	brown chalcedony	25.9	14.4	1.1	10.4	rt. lateral	38		
4750	15N 37W SW¼ 20-25	5	black banded siltstone	48.3	31.0	7.3	35.0	rt. lateral	38	48 i	
4751	15N 37W SW¼ 20-25	6	black banded siltstone	16.1	22.4	4.0	11.0 11.9	lt. lateral lt. lateral	45 56		ventral retouch dorsal retouch
4762	15N 37W SW¼ 20-25	4	brown chalcedony	26.4	26.9	4.2	25.9	distal	50		
4764	15N 37W SW¼ 20-25	-	black siltstone	13.1	26.9	3.9	7.0		46		
5394	15N 40W SW¼ 20-25	1	black banded siltstone	17.9	7.7	2.3	17.9	rt. lateral	55		
5904	16N 34W SE¼ 20-25	2	black banded siltstone	33.6	29.6	11.2	32.3	lt. lateral	48		
5973	16. 34W SW¼ 20-25	7	black pebble chert	32.4	26.5	5.3	21.2	lt. lateral	66	48 e	
6515	16N 36W NW¼ 20-25	1	black banded siltstone	21.0	13.4	3.7	22.4	rt. lateral	44		
6706	16N 37W NE¼ 20-25	4	grey quartzite	21.2	42.1	5.9	40.5	distal	52		
6938	16N 38W NE¼ 20-25	-	tan quartzite	6.8	15.4	2.6		distal	51		
7431	16N 41W SE¼ 20-25	5	black banded siltstone	21.0	22.1	1.9	21.7	lt. lateral	54	48 j	ventral retouch
8118	17N 36W NE¼ 20-25	1	black banded siltstone	15.1	7.0	1.9	15.1	rt. lateral	43		
8182	17N 37W SE¼ 20-25	2	fine green siltstone	48.0	35.0	6.5	37.3	lt. lateral	62	48 b	
8231	17N 37W NE¼ 20-25	2	black banded siltstone	22.4	18.8	3.2	12.2	lt. lateral	67		
8424) 8644)	17N 39W SE¼ 20-25 17N 41W SW¼ 20-25	-	dark grey pebble chert	42.3	27.3	8.0	33.3	lt. lateral	75	48 g	concave retouch (spokeshave)
1672) 1679)	13N 39W NW¼ 25-30 13N 39W NW¼ 30-35	6	tan siltstone	93.2	31.3	13.2	73.9 55.9 57.1	rt. lateral lt. lateral rt. lateral	68 56 57	50 b	dorsal retouch dorsal retouch ventral retouch
1701	13N 40W SE¼ 25-30	1	black banded siltstone	35.7	24.3	9.9	31.0	rt. lateral	56		
1805	13N 40W NE¼ 25-30	1	fine green siltstone	23.5	21.0	3.9	18.0	rt. lateral	53		wear on left lateral edge
1856	13N 40W NW¼ 25-30	4	grey quartzite	37.5	13.7	8.0	9.1	distal	59		
1964	13N 41W SW¼ 25-30	5	dark grey pebble chert	25.6	21.5	11.4	22.2	rt. lateral	57	49 a	ventral retouch
2019	13N 41W NE¼ 25-30	1	petrified wood	22.4	20.0	5.3	9.6	rt. lateral	72		
2586	14N 36W SW¼ 25-30	2	crystalline siltstone	30.6	29.2	5.6	11.1	lt. lateral	56		
2644	14N 36W NE¼ 25-30	2	black banded siltstone	17.6	14.5	3.0	14.9	lt. lateral	54		

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
3354	14N 40W NE¼ 25-30	5	crystalline siltstone	126.4	36.9	15.0	122.4	lateral	70	50 a	retouched piece (side scraper)
4117	15N 34W SE¼ 25-30	2	black banded siltstone	19.5	15.9	4.2	14.1	lt. lateral	73		
4118	15N 34W SE¼ 25-30	2	crystalline siltstone	27.9	9.5	1.9	16.4	lt. lateral	62		
4612	15N 36W NE¼ 25-30	2	dull green siltstone	37.2	17.0	6.5	33.1	lt. lateral	55		
5053	15N 38W NE¼ 25-30	-	dark brown chalcedony	12.8	5.5	3.0	12.8	lt.? lateral	73		
5158	15N 39W SE¼ 25-30	4	opaque purple chert	46.3	32.0	10.2	31.4	distal	58	49 e	
5255	15N 39W NE¼ 25-30	2	dark grey pebble chert	21.4	17.1	3.1	20.0	lt. lateral	56	49 c	
5983	16N 34W SW¼ 25-30	2	black banded siltstone	30.5	13.7	2.3	26.5	lt. lateral	46		
6238	16N 35W SW¼ 25-30	1	mottled blue-grey chert	16.4	20.0	2.6	13.9	rt. lateral	62		
6670	16N 37W SW¼ 25-30	1	mottled yellow chalcedony	16.4	8.3	3.3	16.2	rt. lateral	72		
7009	16N 38W NW¼ 25-30	-	tan quartzite	6.9	15.1	2.8	15.1	distal	71		
7393	16N 40W NW¼ 25-30	4	black pebble chert	16.7	27.9	5.1	27.9	distal	63	49 b	also some lateral retouch
8059	17N 36W SE¼ 25-30	4	dark grey pebble chert	32.2	14.8	2.3	32.2 14.8 32.2	rt. lateral distal lt. lateral	67 59 62	49 d	
1589	13N 39W SW¼ 30-35	1	opaque wine chalcedony	11.0	11.2	1.5	7.2	rt. lateral	69		
1710	13N 40W SE¼ 30-35	4	black banded siltstone	36.7	17.9	5.3	18.5	distal	64		ventral use
1812	13N 40W NE¼ 30-35	-	dull green siltstone	17.1	9.1	2.9	12.3	basal	65		bifacially retouched
2981	14N 38W SW¼ 30-35	5	black banded siltstone	16.5	10.0	3.4	15.3	rt. lateral	59		ventral retouch
3359	14N 40W NE¼ 30-35	2	crystalline siltstone	31.6	75.0	16.9	16.6 67.6	rt. lateral distal	67 72	51 g	
3511	14N 41W SW¼ 30-35	1	crystalline siltstone	49.1	55.0	12.4	40.9	rt. lateral	63	51 e	
3512	14N 41W SW¼ 30-35	1	crystalline siltstone	21.6	22.3	2.2	17.6	rt. lateral	68	51 c	retouched?
3717	14N 42W SW¼ 30-35	1	black banded siltstone	16.0	20.9	2.6	16.2	rt. lateral	66	51 d	
4619	15N 36W NE¼ 30-35	2	dull green siltstone	14.9	24.4	3.2	9.6	lt. lateral	49		
4955	15N 38W SE¼ 30-35	2	crystalline siltstone	41.5	22.3	5.9	30.9	lt. lateral	55	51 b	
5002	15N 38W SW¼ 30-35	4	opaque blue-white chert	18.9	16.9	5.1	15.9 16.6	lt. lateral distal	43 60		
5310	15N 39W NW¼ 30-35	-	crystalline siltstone	11.9	7.2	1.9	7.3	basal	58		
5827 5650	15N 42W NE¼ 25-30 15N 41W SW¼ 30-35	2	black banded siltstone	53.0	47.9	7.5	38.2	lt. lateral	51	51 f	
6285	16N 35W NE¼ 30-35	2	grey qyartzite	51.0	37.9	7.6	38.4	lt. lateral	66	51 a	
7398	16N 40W NW¼ 30-35	1	crystalline siltstone	17.6	13.5	2.8	17.0	rt. lateral	40		
7583	16N 42W NE¼ 30-35	4	dull green pebble chert	35.0	14.6	4.5	10.8	distal	67		
8060	17N 36W SE¼ 30-35	4	black banded siltstone	31.6	20.9	4.2	12.0	distal	61		

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
1685	13N 39W NW¼ 35-40	2	red quartzite	36.4	23.7	8.5	29.7	lt. lateral	53		
1978	13N 41W SW¼ 35-40	1	crystalline siltstone	36.3	31.1	11.2	18.2	rt. lateral	65		
3866	14N 43W NE¼ 35-40	2	grey quartzite	36.0	19.7	9.2	33.4	lt. lateral	63	52 f	
4302	15N 34W NW¼ 35-40	5	tan-grey quartzite	25.6	23.3	6.3	17.3 18.8	rt. lateral lt. lateral	70 65		ventral use retouch ventral use retouch
4303	15N 34W NW¼ 35-40	1	dark grey siltstone	17.0	11.2	1.5	17.5	rt. lateral	40		
5010	15N 38W SW¼ 35-40	3	green siltstone	36.2	20.4	7.8	35.0 37.3	rt. lateral lt. lateral	61 68		
5068	15N 38W NE¼ 35-40	1	dull green siltstone	23.9	31.5	4.7	31.9	rt. lateral	38	52 c	
5166	15N 39W SE¼ 35-40	4	grey quartzite	69.8	75.2	18.4	48.4	distal	75		
5268	15N 39W NE¼ 35-40	2	dull green siltstone	12.9	16.9	3.6	16.2	lt. lateral	52		
5317	15N 39W NW¼ 35-40	1	crystalline siltstone	32.3	40.0	9.9	28.9	rt. lateral	56	52 i	
5550	15N 40W NW¼ 35-40	1	grey pebble chert	27.1	11.8	4.0	12.9	rt. lateral	61	52 e	
6148	16N 34W NW¼ 35-40	1	grey pebble chert	41.1	21.5	4.2	34.7	rt. lateral	68	52 a	
6390	16N 36W SE¼ 35-40	1	grey-brown chalcedony	22.9	14.7	4.4	22.3	rt. lateral	56	52 d	
6534	16N 36W NW¼ 35-40	3	crystalline siltstone	39.6	24.5	10.1	37.6 13.7	lt. lateral rt. lateral	54 42	52 h	
6640	16N 37W SE¼ 35-40	-	mottled yellow chalcedony	26.0	27.9	4.6					notched flake
7182	16N 39W NE¼ 35-40	1	soft tan shale	42.6	25.5	8.5	28.0	rt. lateral	58	52 g	
7274	16N 40W SE¼ 35-40	1	weathered grey siltstone	28.2	15.3	2.1	28.0	rt. lateral	45	52 b	
7825	17N 34W NE¼ 35-40	1	dark grey pebble chert	28.0	25.2	2.8	26.7	rt. lateral	43		
8513	17N 39W NE¼ 35-40	1	black pebble chert	25.3	16.7	10.5	25.5	rt. lateral	58		
1559	13N 39W SE¼ 40-45	6	white S.V. chert	15.6	13.4	2.1	15.0 6.5	lt. lateral distal	61 55	54 a	dorsal ventral
1560) 2941)	13N 39W SE¼ 40-45 14N 38W SE¼ 40-45	4	light brown jasper	32.8	14.2	4.2	28.9 13.5	lt. lateral distal	70 45		
1868	13N 40W NW¼ 40-45	1	dull green siltstone	45.8	38.0	12.8	46.7	rt. lateral	72	53 b	
3323	14N 40W SW¼ 40-45	2	dull green siltstone	74.2	44.7	9.6	61.2	lt. lateral	73	53 a	(side scraper)
3732	14N 42W SW¼ 40-45	4	black pebble chert	25.0	28.3	8.3	16.1 12.8 19.6	rt. lateral distal lt. lateral	58 53 59	54 g	
3874	14N 43W NE¼ 40-45	2	crystalline siltstone	65.0	44.5	16.2	51.7	lt. lateral	61	53 c	
4717	15N 37W SE¼ 40-45	4	crystalline siltstone	15.2	31.0	6.3	12.2 27.5	lt. lateral distal	47 45		(end scraper fragment?)
5019	15N 38W SW¼ 40-45	1	crystalline siltstone	45.9	36.0	8.7	28.0	rt. lateral	50		

Table Ap-6: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF WORKED EDGE	PLACEMENT OF WORKED EDGE	EDGE ANGLE	FIGURE	REMARKS
5553	15N 40W NW¼ 40-45	1	dull green siltstone	19.1	23.5	5.3	22.6	rt. lateral	56	54 c	
5768	15N 42W SE¼ 40-45	2	dull red chalcedony	57.6	36.0	4.3	55.3	lt. lateral	31	54 h	use retouch
6768	16N 37W NW¼ 40-45	2	black banded siltstone	24.6	23.1	3.0	16.7	lt. lateral	64		
6960	16N 38W NE¼ 40-45	1	crystalline siltstone	32.3	13.2	2.5	10.5	rt. lateral	69		
6961	16N 38W NE¼ 40-45	4	crystalline siltstone	20.4	18.4	6.2	23.8 11.6	rt. lateral distal	59 56		bifacial retouch
6969	16N 38W NE¼ 40-45	7	brown pebble chert	30.0	20.5	6.7	22.5	rt. lateral	63	54 d	split pebble
7077	16N 39W SE¼ 40-45	5	green quartzite	25.4	21.0	4.2	15.5	rt. lateral	39	54 f	use retouch (also distal use)
7136	13N 38W NW¼ 40-45	1	creamy-tan chert	17.5	20.2	5.6	16.0	rt. lateral	69	55 a	
7531	16N 41W NW¼ 40-45	4	mottled yellow S.V. chert	41.7	27.6	7.8	33.6 19.6 37.8	rt. lateral distal lt. lateral	62 63 63	54 e	
7532	16N 41W NW¼ 40-45	5	black banded siltstone	23.1	14.9	3.9	18.5	rt. lateral	67		ventral retouch
7588	16N 42W NE¼ 40-45	2	black banded siltstone	25.0	17.2	3.1	24.6	lt. lateral	58		use retouch
8266	17N 37W NW¼ 40-45	1	brown jasper (chert)	22.3	28.3	4.0	26.6	rt. lateral	53	54 b	
1722	13N 40W SE¼ 45-50	3	black siltstone	17.6	21.3	3.6	17.3 20.6	rt. lateral lt. lateral	70 50	55 b	
3432	14N 40W NW¼ 45-50	2	dull green siltstone	42.9	46.1	14.6	34.4	lt. lateral	46	55 g	
3433	14N 40W NW¼ 45-50	1	black pebble chert	21.9	12.9	2.7	11.3	rt. lateral	63	55 d	
3577	14N 41W NE¼ 45-50	-	dark grey pebble chert	47.8	19.9	6.0	35.0 33.4 26.0 17.3	rt. lateral lt. lateral rt. lat. (v) lt. lat. (v)	65 67 67 65	30 e	beaked scraper ventral & dorsal retouch
5565	15N 40W NW¼ 45-50	2	black banded siltstone	32.2	46.6	12.4	32.4	lt. lateral	63	55 i	
7282	16N 40W SE¼ 45-50	4	dark grey pebble chert	15.5	24.0	4.0	16.0 9.0 14.2	rt. lateral distal lt. lateral	67 79 66	55 c	
7082	16N 39W SE¼ 45-50	2	grey quartzite	39.5	22.2	6.9	26.0	lt. lateral	65		
7330 7288	16N 40W SW¼ 45-50 16N 40W SE¼ 50-55	6	dull wine siltstone	38.8	19.1	5.2	11.3 20.0	lt. lateral lt. lat. (v)	65 49	55 f	
7442	16N 41W SE¼ 45-50	1	weathered grey siltstone	26.0	13.7	5.6	16.0	rt. lateral	44		use retouch?
8445	17N 39W SE¼ 45-50	1	black banded siltstone	39.5	30.9	6.1	36.8	rt. lateral	65	55 e	
8538	17N 39W NW¼ 45-50	1	grey siltstone	30.9	21.8	7.2	24.3	rt. lateral	50	55 h	use retouch

Table Ap-7: Quantitative and qualitative attributes of end scrapers recovered from the Block Excavation

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF DISTAL EDGE	ANGLE OF DISTAL EDGE	FIGURE	REMARKS
3781	14N 42W NW¼ 0-5	1	black siltstone	22.9	21.8	6.0	22.0	80	58 c	wear on lateral edges
5453	15N 40W NE¼ 0-5	3	dark brown chalcedony	12.3	12.1	5.4	12.3	83	58 f	wear also on lateral edges
6488	16N 36W NW¼ 0-5	4	black banded siltstone	28.1	16.5	7.5	16.5	72	58 b	concave retouch on lateral edges
7736	17N 34W SW¼ 0-5	3	grey trans. chalcedony	39.2	31.4	8.2	45.0	35	58 a	
1371	13N 35W NE¼ 5-10	2	grey banded siltstone	31.8	23.2	7.5	28.5	85	58 m	some wear on rt. lateral edge
1453	13N 36W SE¼ 0-10	3	grey quartzite	18.1	15.9	4.1	17.5	62	58 j	lateral edge retouch
1482	13N 36W NE¼ 0-10	1	crystalline siltstone	38.8	35.0	19.0	41.0	92	58 i	retouch on right lateral edge
3790	14N 42W NW¼ 5-10	3	grey pebble chert	19.2	15.5	4.5	19.0	50	58 g	
3845	14N 43W NE¼ 5-10	4	dark grey siltstone	30.4	22.2	5.4	24.0	83	58 k	lateral edge retouch
5034	15N 38W NE¼ 5-10	4	banded red quartzite	20.4	21.3	5.0	21.0	64	58 l	
6301	16N 35W NW¼ 5-10	1	crystal quartz	17.0	20.8	6.1	16.5	55	58 e	retouch on left lateral edge
6495 6496 6513	16N 36W NW¼ 5-10 16N 36W NW¼ 10-15 16N 36W NW¼ 20-25	1	grey pebble chert	33.1	28.2	6.1	33.0	72	59 k	retouch on right lateral edge
7413	16N 41W SW¼ 5-10	3	blue-grey S. V. chert	15.6	15.5	3.7	18.0	70	58 d	
7570	16N 42W NE¼ 5-10	2	grey pebble chert	12.4	22.0	4.3	27.0	91	58 h	
1881	13N 41W SE¼ 10-15	4	opaque purple chert	11.5	18.7	4.6	16.9	66	59 i	
2476	14N 35W NW¼ 10-15	8	pink-wine chalcedony	12.9	19.7	3.8	20.5	45		hafted Besant point
2705	14N 37W SE¼ 10-15	1	crystalline siltstone	31.7	23.2	7.0	22.2	59	59 e	
2800	14N 37W NE¼ 10-15	1	black banded siltstone	39.6	21.0	6.9	16.7	58	59 f	lateral edges retouched
3175 3213 3259 3227 3386 3350 5416 6994	14N 39W NE¼ 5-10 14N 39W NW¼ 10-15 14N 40W SE¼ 10-15 14N 39W NW¼ 20-25 14N 40W NW¼ 10-15 14N 40W NE¼ 20-25 15N 40W SW¼ 30-35 16N 38W NW¼ 15-20	1	light tan opaque chert	46.9	45.1	11.7	43.7	72	60 b	partially reassembled from 8 different pieces
3294	14N 40W SW¼ 10-15	1	mottled brown chalcedony	21.8	21.3	6.5	8.4	93	59 g	
3337	14N 40W NE¼ 10-15	1	black pebble chert	14.9	20.4	5.3	20.5	71	59 j	
3801	14N 42W NW¼ 10-15	4	black banded siltstone	23.1	20.5	5.6	20.5	73	59 m	
4633	15N 36W NW¼ 10-15	2	dull green pebble chert	22.0	19.5	3.4	19.5	74	59 n	
4798	15N 37W NE¼ 10-15	2	black pebble chert	16.3	14.2	3.9	10.0	87	59 l	rt. & lt. lateral edges retouched
4917	15N 38W SE¼ 10-15	6	grey quartzite	60.4	42.8	13.2	33.4	91	60 c	ventral retouch

Table Ap-7: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF DISTAL EDGE	ANGLE OF DISTAL EDGE	FIGURE	REMARKS
6639	16N 37W SW¼ 10-15	4	black banded siltstone	13.3	15.6	3.4	15.1	62	59 d	ventral retouch
6745	16N 37W NW¼ 10-15	4	grey pebble chert	13.1	12.8	2.9	13.6	60	59 c	wear on dorsal ridge
6920	13N 38W NE¼ 10-15	2	grey pebblec chert	28.2	25.7	7.9	23.9	94	59 o	retouch on lt. lateral edge
6989	16N 38W NW¼ 10-15	1	crystalline siltstone	7.7	12.3	2.3	11.5	71	59 b	
7152	16N 39W NE¼ 10-15	3	blue-grey S. V. chert	12.0	12.8	3.2	12.8	72	59 a	retouch on lt. lateral edge
7514	16N 41W NW¼ 10-15	1	brown petrified wood	19.5	15.2	4.3	15.2	84	59 h	lateral edges retouched
3100	14N 39W SE¼ 15-20	1	wine chalcedony	12.6	16.0	5.2	27.0	48		
3216	14N 39W NW¼ 15-20	4	grey banded siltstone	53.1	44.2	19.4	46.0	78	60 a	lateral edges retouched
3753	14N 42W NE¼ 15-20	1	black banded siltstone	18.4	19.9	5.4	25.0	64		lateral edges retouched
4169	15N 34W SW¼ 15-20	7	black banded siltstone	43.5	26.7	10.6		93		continuous round retouch
4219	15N 34W NE¼ 15-20	3	black pebble chert	19.0	18.2	5.8	24.0	62		retouch on rt. lateral edge
4596	15N 36W NE¼ 15-20	4	brown chalcedony	44.1	26.3	6.7	26.0	63		lateral edges retouched
4639) 6871)	15N 36W NW¼ 15-20 16N 38W SW¼ 30-35	1	dark brown chalcedony	43.4	19.4	4.9	21.5	64	(6871= 61 e)	lateral edges retouched
5041	15N 38W NE¼ 15-20	2	crystalline siltstone	26.5	23.2	9.3	24.0	68		lateral edges retouched
7850	17N 34W NW¼ 15-20	2	blue-grey chert	18.0	12.6	2.6	16.0	74		retouch on rt. lateral edge
8552	17N 40W SE 15-20	4	black banded siltstone	11.5	22.2	4.0	23.0	76		lateral edges retouched
1433	13N 35W NW¼ 20-25	4	grey pebble chert	29.5	20.5	5.0	20.0	74		lateral edges retouched
1643 3393 1622	13N 39W NW¼ 5-10 14N 40W NW¼ 10-15 13N 39W NE¼ 20-25	3	mottled brown chalcedony	27.4	26.6	6.1	64.0	85		in three articulating pieces semi-circular retouched
2725	14N 37W SE¼ 20-25	1	black siltstone	21.5	21.2	5.5	20.6	78		retouch on lt. lateral edge
2773	14N 37W SW¼ 20-25	4	crystalline siltstone	31.3	22.2	5.9	19.5	68		
2872	14N 37W NW¼ 20-25	1	black banded siltstone	14.9	19.2	13.3	22.3	68		
3451	14N 41W SE¼ 20-25	1	grey pebblec chert	29.4	25.6	10.1	30.0	94		wear on rt. lateral edge
3452	14N 41W SE¼ 20-25	4	grey pebblec chert	18.6	19.4	3.0	31.0	60		
4822	15N 37W NE¼ 20-25	8	grey transl. chalcedony	13.5	16.4	4.3	20.2	45		
5393) 5745)	15N 40W SW¼ 20-25 15N 42W SE¼ 5-10	4	grey quartzite	40.2	25.9	4.9	27.5	63		in two articulating pieces
8425	17N 39W SE¼ 20-25	1	crystalline siltstone	8.2	12.2	2.7	15.4	70		
4116	15N 34W SE¼ 20-25	3	opaque wine chert	12.0	14.0		16.5	69	61 c	
6710	16N 37W NE¼ 25-30	3	drak brown chalcedony	22.6	19.9	4.4	23.0	77	61 a	
8402	17N 38W NW¼ 25-30	3	light brown chalcedony	12.7	14.7	4.8	25.0	88	61 b	
2888	14N 37W NW¼ 30-35	4	black banded siltstone	39.2	25.5	7.1	29.0	84	61 f	

Table Ap-7: continued

CAT. NO.	PROVENIENCE	TYPE	MATERIAL	LENGTH	WIDTH	THICKNESS	LENGTH OF DISTAL EDGE	ANGLE OF DISTAL EDGE	FIGURE	REMARKS
3667	14N 42W SE¼ 30-35	1	crystalline siltstone	27.1	23.0	6.0	25.5	69	61 d	retouch on rt. lateral edge
3860	14N 43W NE¼ 30-35	4	black banded siltstone	24.0	23.8	4.9	27.0	64	61 h	retouch on lt. lateral edge
4618	15N 36W NE¼ 30-35	1	pink chert	26.2	23.2	6.3	25.5	58	61 i	retouch on lt. lateral edge
4833	15N 37W NE¼ 30-35	4	black pebble chert	12.3	22.0	2.8	25.5	55		
4954	15N 38W SE¼ 30-35	3	transl. grey chert	19.0	24.1	6.5	35.5	84	61 j	retouch on rt. lateral edge
1929	13N 41W SE¼ 35-40	1	grey pebble chert	42.8	27.9	12.6	37.5	61	62 f	
3571	14N 41W NE¼ 35-40	4	crystalline siltstone	50.4	29.3	7.9	34.5	72	62 b	heavy use on lt. lateral edge
4301	15N 34W NW¼ 35-40	1	weathered grey siltstone	28.5	24.0	9.2	24.0	67	62 e	wear on rt. lateral edge
4455	15N 35W NE¼ 35-40	1	dark brown chalcedony	31.8	28.7	13.2	36.5	67	62 c	retouch on lateral edges
5490	15N 40W NE¼ 35-40	1	mottled grey chert	41.5	32.0	8.3	44.0	89	62 a	
5835	15N 42W NE¼ 35-40	5	mottled grey chert	37.8	24.7	7.7	32.0	81		retouch on lateral edges
6475	16N 36W NE¼ 35-40	1	dark brown chalcedony	27.0	22.5	8.3	28.0	73	61 g	
8440	17N 39W SE¼ 35-40	3	grey pebblec chert	22.7	36.1	10.8	42.0	66	62 d	retouch on lateral edges
3679	14N 42W SE¼ 40-45	2	blue-grey pebble chert	19.7	17.5	6.6	20.5	58	62 h	wear on lateral edges
4627	15N 36W NE¼ 40-45	5	black siltstone	19.2	25.6	7.3	27.0	66	63 h	
4898	15N 37W NW¼ 40-45	4	brown chert (jasper)	31.6	24.7	8.6	32.5	74	63 c	retouch on rt. lateral edge
5016	15N 38W SW¼ 40-45	5	dark grey pebble chert	34.4	22.0	11.2	26.2	70	63 e	retouch on lateral edges
6396	16N 36W SE¼ 40-45	5	black banded siltstone	23.2	28.0	5.8	30.0	71	63 f	retouch on rt. lateral edge
6430	16N 36W SW¼ 40-45	1	creamy white chert	20.6	21.1	6.0	28.0	74	62 i	wear on lt. lat. & dorsal
3576	14N 41W NE¼ 45-50	2	light blue pebble chert	21.5	16.6	5.6	18.0	81	62 g	
4148	15N 34W SE¼ 45-50	5	dark grey pebble chert	29.0	22.1	5.0	26.0	68	63 a	lateral edges retouched
5621	15N 41W SE¼ 45-50	2	grey siltstone	61.4	36.0	11.0	44.0	76	63 d	lateral edges retouched
7371	16N 40W NE¼ 45-50	1	creamy grey chert	10.5	24.6	9.0	27.0	77	62 j	scraper fragment
7590	16N 42W NE¼ 45-50	2	dark grey pebble chert	23.2	21.3	4.8	19.9	61	63 g	retouch on lateral edges
8451	17N 39W SE¼ 45-50	5	dark grey pebble chert	41.1	30.4	7.6	36.0	68	63 b	retouch on lateral edges

APPENDIX II

THE FAUNAL REMAINS FROM THE SIBBALD CREEK SITE

by

Donald A. Barnett

THE FAUNAL REMAINS FROM THE SIBBALD CREEK SITE

INTRODUCTION

A fairly modest quantity of faunal remains was retrieved from the excavations at the Sibbald Creek site. This material was found mainly in the Block Excavation and comprised portions of at least seven bison as well as a minimum of seven other identifiable animals, plus numerous small fragments.

PROCEDURES

The catalogued collection was examined for identifiable elements. These were then sorted into skeletal element categories and taken to the University of Calgary for identification by comparison with the faunal collection at the Department of Archaeology. Brian Kooyman, a graduate student, provided the junior author useful assistance, particularly in identifying some of the more difficult items, including bone tools and tool marks.

In the past, the region of Sibbald Flat was inhabited by a variety of large mammals such as bison, elk, moose, deer, and bear. It has been used as range land for domestic animals since the end of the last century. The report by Brown and Gustafson (1979) was found to be helpful for distinguishing bison remains from those of other animals which may have been indigenous to this part of the Alberta Foothills. Other references consulted included Sisson and Grossman (1975) and the report by Lawrence (1951) on deer, pronghorn, sheep-goat, and Bos-bison remains. The junior writer also drew upon his personal experience with faunal material gained during the 1979 University of Calgary Field School at the Fish Creek bison kill site, EfPm-27.

An inventory was compiled of all the identifiable elements recovered from EgPr-2 and was submitted under seperate cover to the Archaeological Survey of Alberta (Barnett 1981). The inventory contains basic data concerning element, species and side, pertinent information on provenience, condition of the bone, presence or absence of cut marks or other cultural characteristics, and evidence of burning or charring.

Bone pieces were refitted to ensure a greater degree of confidence in identification and element counts. It was also thought that the horizontal and vertical distributions of conjoining fragments might shed light on the relative ages of the bones, or disclose local areas of cultural activities. To further aid in the analysis, diagrams were drawn to illustrate the spatial clustering of faunal elements and their possible association with other cultural features at EgPr-2.

CONDITION OF THE FAUNAL REMAINS

Five ranks were established to define the condition of the faunal remains; excellent, good, fair, poor, and very poor. Generally, bones considered to be in excellent state displayed high surface gloss and retained fine detail in areas such as articular facets. Good examples still had some surface gloss but had lost the sharp edges such as those of articular facets. Fair examples had lost most of the surface sheen and lacked the fine details, although they still retained a smooth, uncracked and unetched surface. Bone in poor condition displayed a rough and cracked surface. The bone in very poor condition had deteriorated to such a degree that it could easily be damaged even with a fingernail. Only a few examples of bone in this last state of preservation were recovered from the site.

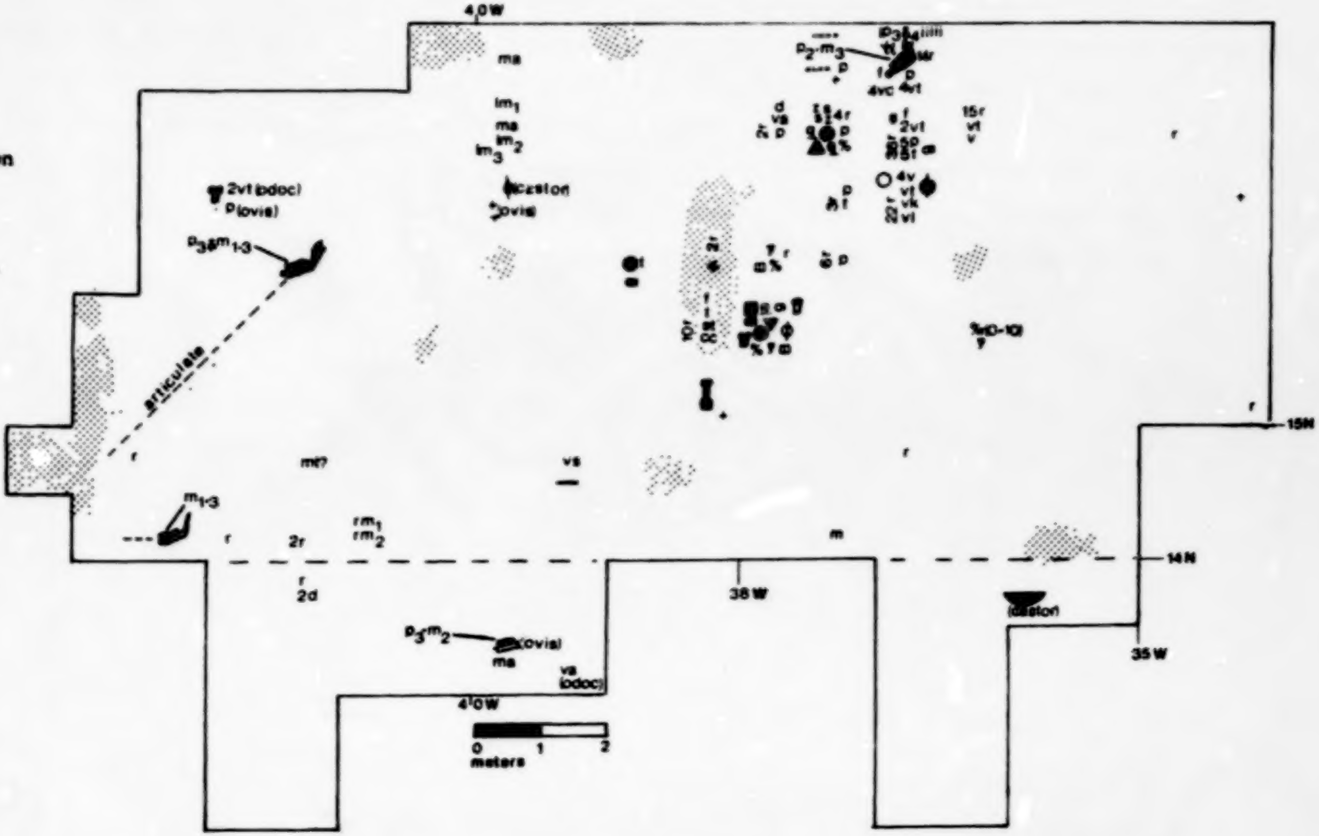
Generally speaking, the state of preservation of the faunal remains varied throughout the site. Below the 20 cm level only calcined fragments and bits of tooth enamel were found. The condition of the bone recovered from the upper 20 centimeters of the deposits was found to be highly variable, even between two areas of the same element, or between two articulating bones. It was therefore concluded that the state of preservation was not necessarily a reliable indicator of the relative ages of the faunal remains.

HORIZONTAL AND VERTICAL ASPECTS OF THE FAUNAL REMAINS

Introduction

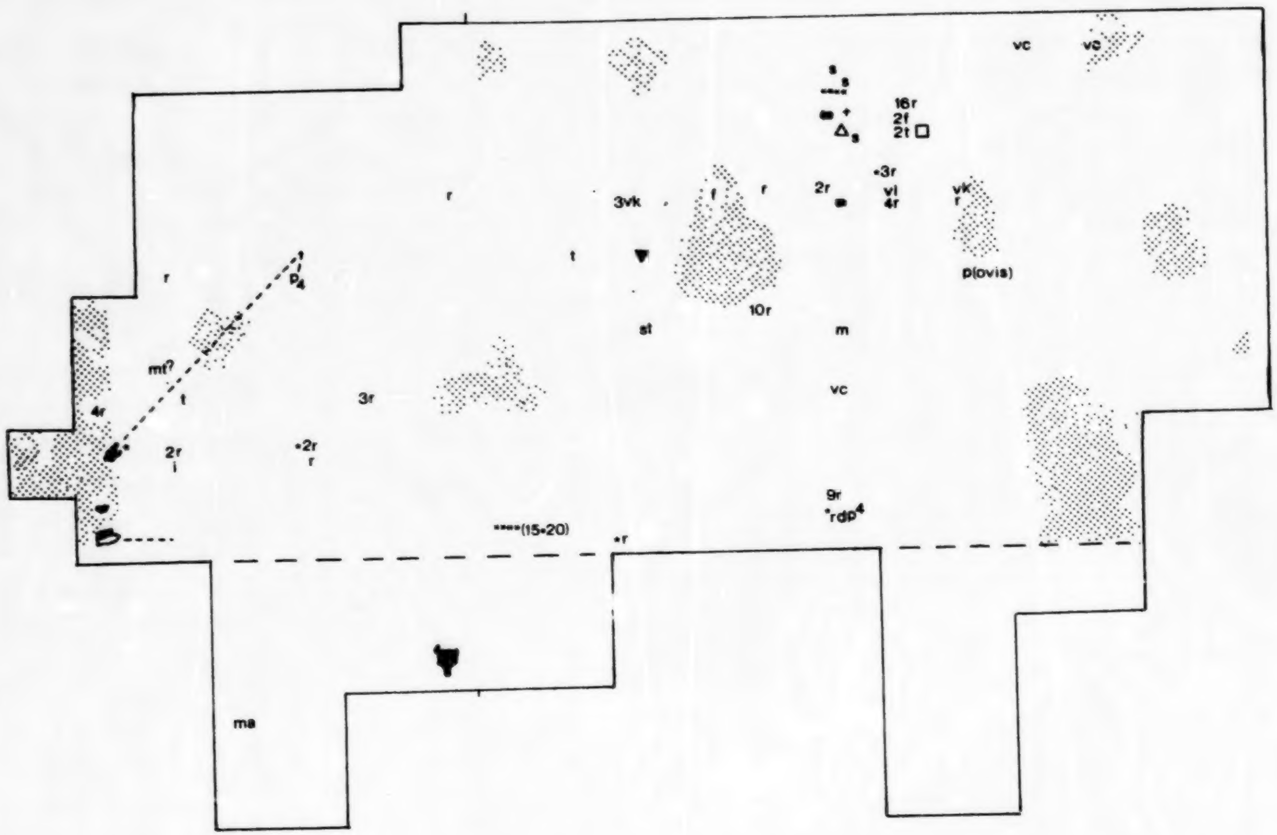
Approximately 250 individual items were recorded and described in the faunal inventory (Barnett 1981). The majority of them came from the Block Excavation while a lesser quantity was recovered from units located peripheral to this large area of contiguous units.

Figures 94a-b and 95a-c illustrate the clustering or dispersion of the bone within the Block Excavation. It should be noted that the locations of bone on the map are approximate since the smallest unit of provenience was the 1 x 1 m unit. Figure 96 illustrates the distribution of faunal remains other than bison throughout the site and the occurrence of bison elements outside the Block Excavation.


40W
ma
lm$_1$
ma
m$_2$
lm$_3$
castor
ovis
2vt (odoc)
p (ovis)
p$_3$&m$_{1-3}$
articulate
m$_{1-3}$
mt?
r
2r
rm$_1$
rm$_2$
r
2d
vs
p$_3$m$_2$
(ovis)
ma
vs (odoc)
4'0W
0 1 2 meters
38W
m
p$_2$-m$_3$
p$_3$
4vc 4vt
2vt
15r
vt
v
4v
vt
vk
vt
%0-10
r
15N
14N
35W
(castor)

▨	burnt bone concentration
	mandible, right
	mandible, left
ma	mandible, side undeter.
rm$_1$	molar, 1st rt., lower
rm$_2$	molar, 2nd rt., lower
lm$_1$	molar, 1st lt., lower
lm$_2$	molar, 2nd lt., lower
lm$_3$	molar, 3rd lt., lower
YY	hyoid (great cornua)
va	atlas vertebra
vc	cervical vertebra
vl	lumbar vertebra
vs	sacral vertebra
vk	caudal vertebra
v	centrum fragment
p	proximal rib fragment
d	distal rib fragment
r	rib shaft fragment
t	rib head
f	rib tubercle
st	sternum
cc	costal cartilage
	metacarpal, rt., proximal
m	metacarpal, shaft
●	intermed. carpal, right
○	intermed. carpal, left
	radial carpal, right
	radial carpal, left
▼	ulnar carpal, right
■	2nd & 3rd carpals, rt.
	4th carpal, right
	4th carpal, left
	metatarsal, right
	metatarsal, prox., left
mt	metatarsal shaft
	tibial tarsal, right
Φ	tibial tarsal, left
	fibular tarsal, left
%	2nd & 3rd tarsals, right
%	2nd & 3rd tarsals, left
	lateral malleolus, left
y	central & 4th tarsals, right
y	central & 4th tarsals, left
s	pisciform
s	sesamoid
	phalanx + 1st; # 2nd; ⁂ 3rd
	castor pes

Figure 94a: Axial skeletal remains, including manus and pes, for the 0-5 cm level of the Block Excavation at EgPr-2.


vc
vc
s
s
16r
2f
2t
3vk
r
r
2r
•3r
vl
4r
vk
r
t
p(ovis)
r
p4
10r
st
m
mt?
4r
t
3r
vc
2r
i
•2r
r
9r
*rdp4
****(15•20)
•r
ma

cranium
mandible, right
mandible, left
ma mandible, side undetermined
i incisor
rp_4 premolar, 4th perm., lower rt.
rdp^4 premolar, 4th decid., upper rt.
vc cervical vertebra

vl lumbar vertebra
vs sacral vertebra
p proximal rib
r rib shaft fragment
t rib head
f rib tubercle
st sternum
m metacarpal shaft

▼ ulnar carpal, right
▽ ulnar carpal, left
● radial carpal, right
☐ 2nd & 3rd carpal, left
mt? metatarsal shaft ?
● lateral malleolus, right
s sesamoid
+ 1st phalanx; # 2nd phalanx

Figure 94b: Axial skeletal remains, including manus and pes, for the 5-10 cm level of the Block Excavation at EgPr-2. Items marked with a star are from the 10-15 cm level.

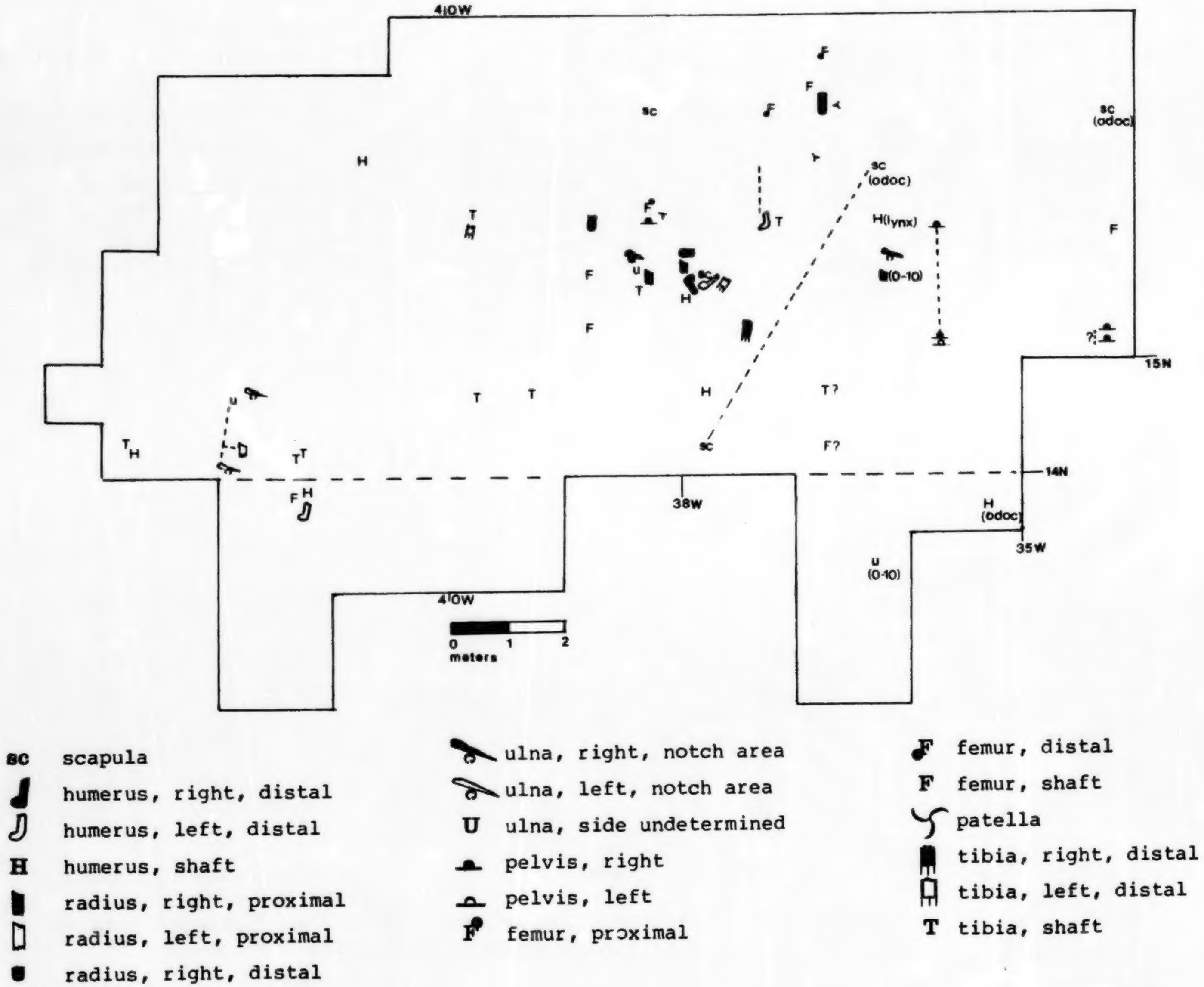

41OW
sc
sc (odoc)
sc (odoc)
H
H(lynx)
(0-10)
F
F
F
F
T
T
T
T
T
U
H
T
TH
TT
FH
H
T?
F?
sc
?
15N
14N
38W
H (odoc)
35W
U (0-10)
41OW
0
1
2
meters
sc scapula
humerus, right, distal
humerus, left, distal
H humerus, shaft
radius, right, proximal
radius, left, proximal
radius, right, distal
ulna, right, notch area
ulna, left, notch area
U ulna, side undetermined
pelvis, right
pelvis, left
femur, proximal
femur, distal
F femur, shaft
patella
tibia, right, distal
tibia, left, distal
T tibia, shaft

Figure 95a: Appendicular skeletal remains, less manus and pes, for the 0-5 cm level of the Block Excavation except where noted otherwise.

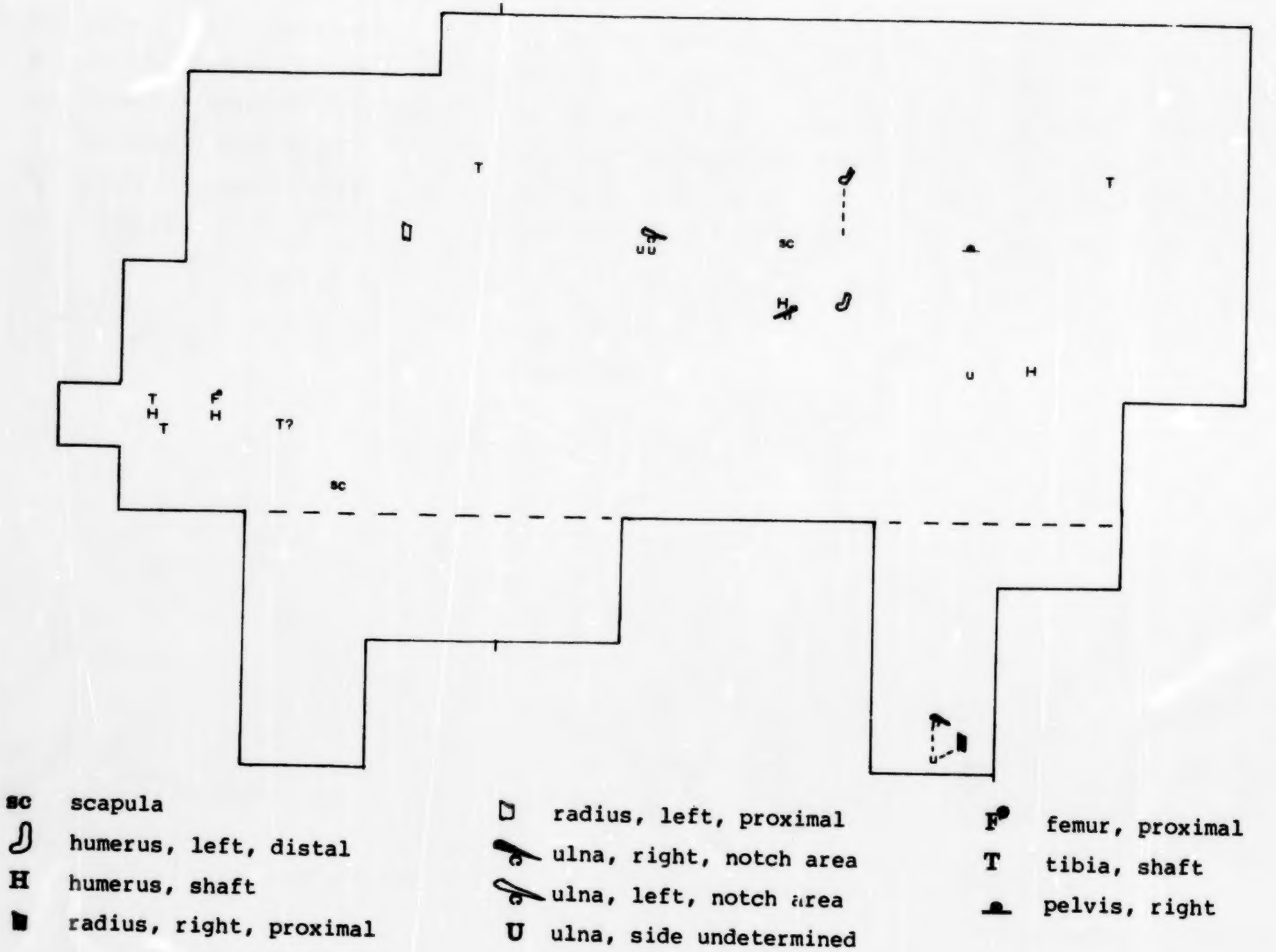

T
T
T
sc
uu
sc
H
u
H
T
H
T
F
H
T?
sc
u
sc scapula
humerus, left, distal
H humerus, shaft
radius, right, proximal
radius, left, proximal
ulna, right, notch area
ulna, left, notch area
U ulna, side undetermined
F femur, proximal
T tibia, shaft
pelvis, right

Figure 95b: Appendicular skeletal remains, less manus and pes, for the 5-10 cm level of the Block Excavation at EgPr-2.

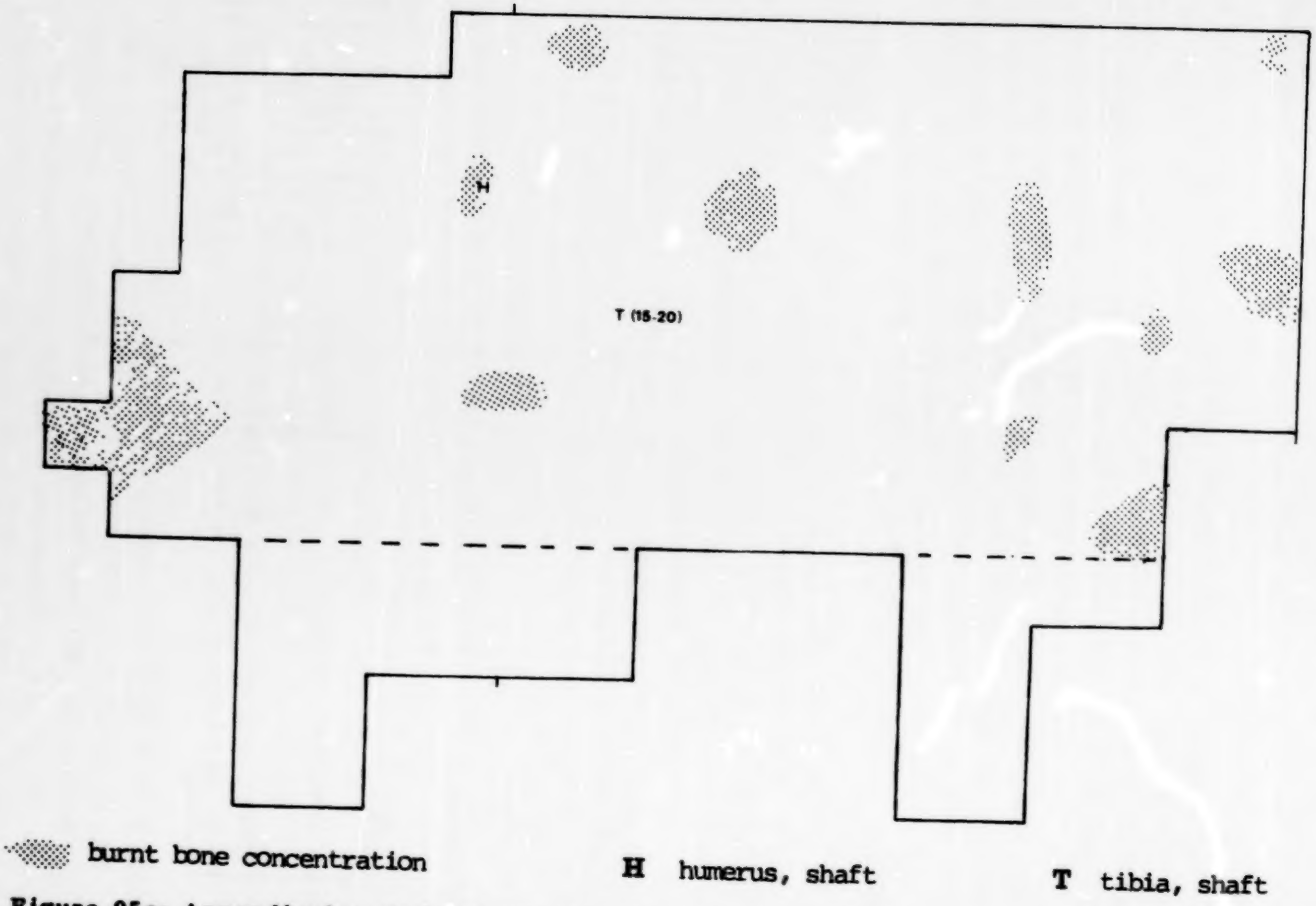
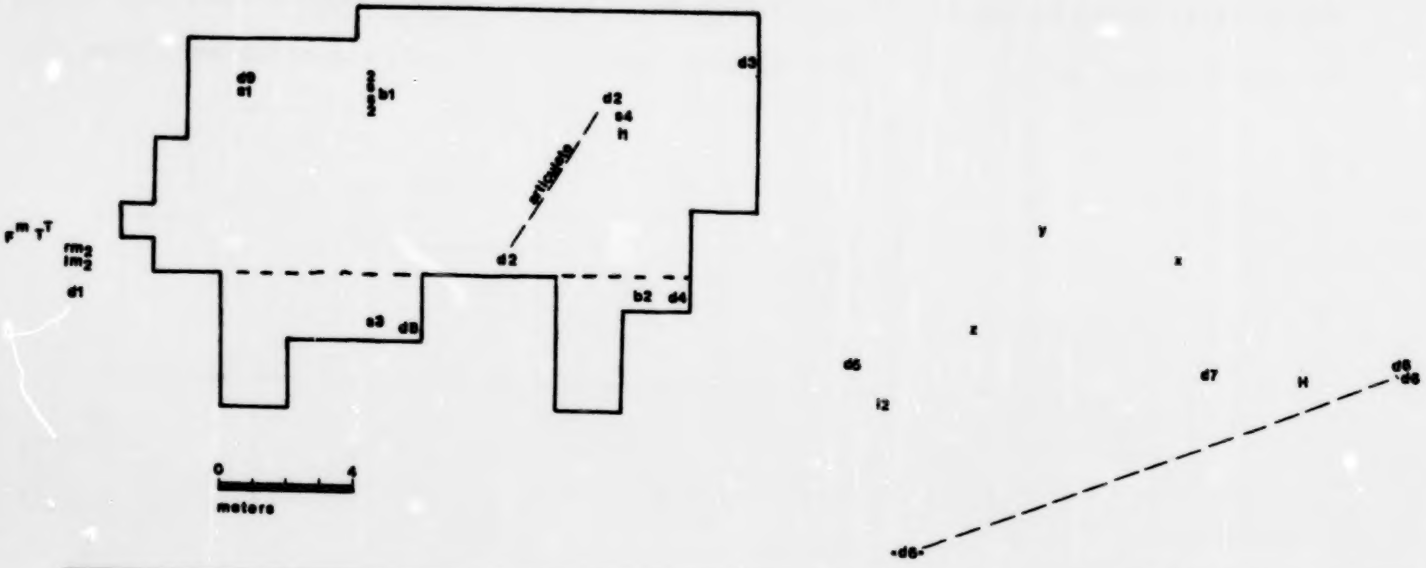

H
T (15-20)
burnt bone concentration
H humerus, shaft
T tibia, shaft

Figure 95c: Appendicular skeletal remains, less manus and pes, for the 10-15 cm level of the Block Excavation, except where otherwise noted.



T= bison tibia frag.
m= bison mandible frag.
rm_2= bison 2nd molar; rt. lower.
lm_2= bison 2nd molar; lt. lower.
F = bison femur frag.
H= bison humerus frag.
x= unid. rib frag. wi. steel tool cuts.
y= unid. thoracic vert. frag. wi. hatchet cut.
z= several unid. shell frags.
not showed; 2nd phalanx; elk. (12N-49W,SW¼)
not showed; 2nd phalanx; elk. (10N-53W,SE¼)

d1= deer radius; prox. frag. (radius awl)
d2= deer scapula frags. wi. steel hatchet cuts.
d3= deer scapula frag. wi. steel hatchet cuts.
d4= deer humerus; prox. frag.
d5= deer (?) phalanx frag.
d6= deer humerus frag. wi.steel tool cut marks. (disturbed)
d6= deer radius and ulna frags. wi. steel tool cuts. (artic.)
d7= deer lumbar vert. frag.
d8= deer (?) atlas frag.
d9= thoracic vert. epiphyses. (2)

s1= sheep ribhead wi. steel tool cut mark.
s2= sheep phalanges.(2)
s3= sheep mandible frag.
s4= 1st rib frag. wi. steel hatchet mark.

b1= beaver astragalus. (tibial tarsal)
b2= articulated beaver rt. pes.

l1= lynx humerus frag. wi. steel tool cut mark.

l2= lynx cranium frags.

Figure 96: Distribution of faunal remains other than bison for EgPr-2, as well as bison remains recovered outside the Block Excavation.

In addition, there were two elk phalanges which were discovered in units located west of the Block Excavation. One (Cat. No. 1022) was found in the southwest quadrant of unit 12N 49W, the other (Cat. No. 328) occurred in the southeast quadrant of unit 10N 54W. Both came from the 0-10 cm level. The majority of non-bison remains from the Sibbald Creek site were recovered from the 0-5 cm level.

Articulating Elements and Their Vertical Distribution

An effort was made to reassemble skeletal sections in order to examine butchering practices and possible vertical displacement. Two units, Nos. 6 and 9 (Table 23), were articulated and had obviously been buried when soft tissues still bound the elements together. In addition to the articulating units listed in Table 23, there were several questionable associations of bison phalanges, sesamoids, and an intact metapodial; vertebral fragments and proximal as well as other portions of ribs were also found in the northeast section of the Block Excavation (Figure 94a). The vertebrae were badly reduced and it could not be determined whether they were articulated with the ribs when discarded.

Three of the units (Nos. 2, 4, and 5), representing parts of one front and two hind limbs, were assembled from elements retrieved from both the 0-5 and 5-10 cm levels (Table 23). Other units were restricted to the 0-5 cm level, except Unit No. 3 where vertical provenience was recorded to 0-10 cm. The foregoing suggests that faunal remains relating to one occupation event can be dispersed vertically over at least 10 cm. Furthermore, it indicates that the majority of the bison bone, and all the non-bison remains were recovered from very near the surface.

Other possible examples of faunal remains vertically distributed in the upper layers, are vertebral fragments discovered in the 0-5 and 5-10 cm levels of the northwest quadrant of unit 16N 36W in the Block Excavation; vertebral remains occur infrequently in other areas of the site (Figures 94a and 94b). Also, most pelvic fragments recovered came from the 0-5 and 5-10 cm layers in the eastern side of the Block Excavation. One further refitted example is a bison dentary from the 0-5, 5-10, and 10-15 cm layers in the northwest quadrant of 14N 42W.

Below the 10-15 cm level, the only diagnostic elements were a bison RM$_2$, an RdP^4, a phalanx, and a tibia fragment; all were found in the 15-20 cm level. These elements may represent survivors of earlier occupations, or could have been displaced downward by biological or physical action. They were included here with the rest of the faunal

Table 23: Articulating elements recovered from site EgPr-2

Unit	Element	Cat. No.	Provenience
1*	tibia (distal, left)	4850	15N 37W NW, 0-5 cm
	astragalus	4850	15N 37W NW, 0-5 cm
	calcanium	4850	15N 37W NW, 0-5 cm
	lateral malleolus	4850	15N 37W NW, 0-5 cm
	naviculo-cuboid	4850	15N 37W NW, 0-5 cm
	cuniform pes	4851	15N 37W NW, 0-5 cm
	metatarsal (proximal)	4851	15N 37W NW, 0-5 cm
2	tibia (right)	4663	15N 37W SE, 0-5 cm
	astragalus	6482	16N 36W NW, 0-5 cm
	lateral malleolus	6691	16N 37W NW, 5-10 cm
	naviculo-cuboid	6617	16N 37W SW, 0-5 cm
	cuniform pes	6617	16N 37W SW, 0-5 cm
	metatarsal	4903	15N 38W SE, 0-5 cm
3	naviculo-cuboid (right)	4588	15N 36W NE, 0-10 cm
	cuniform pes	4588	15N 36W NE, 0-10 cm
4	radius (right)	8068	17N 36W SW, 0-5 cm
	ulnar carpal	8168	17N 37W SE, 0-5 cm
	radial carpal	8171	17N 37W SE, 5-10 cm
	intermediate carpal	8168	17N 37W SE, 0-5 cm
	unciform	8168	17N 37W SE, 0-5 cm
	accessory carpal	8171	17N 37W SE, 5-10 cm
5	radius (distal, right)	6839	16N 38W SW, 0-5 cm
	ulnar carpal	6842	16N 38W SW, 5-10 cm
	intermediate carpal	6839	16N 38W SW, 0-5 cm
	radial carpal	6839	16N 38W SW, 0-5 cm
6	radius (distal, right)	4851	15N 37W NW, 0-5 cm
	ulnar carpal	4851	15N 37W NW, 0-5 cm
	intermediate carpal	4851	15N 37W NW, 0-5 cm
	radial carpal	4851	15N 37W NW, 0-5 cm
	magnum	4851	15N 37W NW, 0-5 cm
	unciform	4851	15N 37W NW, 0-5 cm
	metacarpal (proximal)	4851	15N 37W NW, 0-5 cm
7	radius (proximal, left)	3479	14N 41W SW, 0-5 cm
deer	ulna	3479	14N 41W SW, 0-5 cm
		3584	14N 41W NW, 0-5 cm
8	humerus (distal, right)	1367b	ca. 7N 30W, surface
deer	radius	33	12N 24W NE, 0-5 cm
	ulna	33	12N 24W NE, 0-5 cm
9	foot (hind, right)	1407	13N 35W NW, 0-5 cm
beaver	(recent?, in 10 articulating bones)		
10	phalanx (1st)	7204	16N 39W NW, 0-5 cm
sheep	phalanx (2nd)	7204	16N 39W NW, 0-5 cm
(Rocky Mountain sheep)			

*All units are bison, unless otherwise indicated.

material, even though their cultural affiliation or age was much in doubt.

Horizontal Distribution of the Faunal Remains

Faunal remains from the Block Excavation, irrespective of their vertical provenience, largely occur in two clusters; a significant concentration in the east-central part and a smaller one in the southwest corner (Figures 94a and b; 95a, b and c). Of bison, the articulated front limb elements mentioned previously were from these two major bone concentrations. The larger concentration in the east-central section of the Block Excavation also contained most of the scapula parts, many vertebra remains, and all of the proximal rib fragments, two bison sternum fragments and a piece of costal cartilage. Away from these two concentrations only isolated front limb elements were recovered. The distribution of bison hind limb fragments corresponds quite closely with that of the front leg elements.

The horizontal provenience of articulating bison elements (Table 23) indicates that the units came from the vicinity of the larger central concentration of faunal remains. Non-bison remains, on the other hand, tended to occur peripheral to the two major bone concentrations.

Association of Bone Concentrations and Other Cultural Features

The faunal material at EgPr-2 is assumed to have been deposited in a campsite situation, as the occurrence of burnt bone undoubtedly reflects the location of, or close proximity to, hearth areas. The locations of concentrations of burnt bone and fire broken rock and the occurrence of prehistoric implements and lithic chipping stations for the upper 10 centimeters of the Block Excavation is shown in Figures 80 and 81. The two large concentrations of unburnt bone appear to be associated with two prominent hearth areas, one located near the center of the Block Excavation and the other only partially uncovered along the west wall. Plains Side-Notched projectile points were found in the vicinity of both hearths, while obsidian pressure flakes and native ceramics were discovered in the immediate vicinity of the westernmost one.

The association of historic artifacts with the clusters of unburnt bone is less convincing. An Eley container cover, an awl fragment, and two trade beads were found within or close to the southeast quadrant of unit 16N 36W, just southeast of the major bone concentration. Other items that likely date back to the last century, a lead blob, a clay pipe stem, a metal pipe and two trade beads, were found dispersed in the southwestern part of the Block Excavation (Figures 80 and 81). The opinion of the senior writer is that the two concentrations of faunal remains are more closely associated with the possible late prehistoric period hearths, Plains Side-Notched points, and native ceramics than with the historic period items.

MINIMUM NUMBER OF INDIVIDUALS

Considering the faunal sample from the entire site, a minimum of seven bison (*Bison bison*), two beaver (*Castor canadensis*), one lynx (*Lynx canadensis*), one sheep (*Ovis canadensis*), two deer (*Odocoileus hemionus* or *O verginianus*), and one elk (*Cervus elaphus*), were identified.

For bison, the largest minimum number of individuals was obtained from teeth. The minimum number of individuals calculated from non-dental elements of bison and other animal species is given in Table 24. The accretive procedure reflected in Table 24 was used in an attempt to isolate cultural activities and minimize the chance of error.

MINIMUM NUMBER, AGE AND SEX OF BISON

The greater number of individual bison indicated by the dental, as opposed to the non-dental remains, may reflect the resistant nature of teeth to biophysical destruction. In Table 25 the tooth enamel heights were measured where possible for the molars to the nearest tenth of a millimeter. Approximate age estimates for the mature molars were calculated according to the mean metaconid enamel height categories established for the Glenrock bison kill site (Frison 1970:52).

While helpful in estimating approximate age, measurements of mature bison enamel heights are poor indicators for establishing season of death, and hence site seasonality, even in situations of mass kills. Reher and Frison (1980:64) caution that "after eruption ceases, mandibles are more difficult to age, and their seasonality is essentially undeterminable without good samples of juveniles from the same cohort". At EgPr-2 it is not certain if the dental remains belong to one occupation event.

Four juvenile teeth, representing a minimum of three bison, were found. Three mandibular teeth were aged according to the eruption-wear schedule established at the Vore site (Reher and Frison 1980:64-66). If the animals were part of the peak calf crop, and if the data from the Vore site are applicable to the Sibbald Creek site, then the

Table 24: Minimum number of individual animals identified at EgPr-2

		Block Ex. W of 40N			Block Ex. E of 40N			All Block Excavation			All EgPr-2		
Genus	Element	lt.	rt.	MNI	lt.	rt.	MNI	lt.	rt.	MNI	lt.	rt.	MNI
Bison	scapula	1	-	1	1	-	1	1	-	1	1	-	1
"	humerus	1	-	1	3	2	3	4	2	4	5	2	5
"	radius	1	0	1	-	3	3	1	3	3	1	3	3
"	ulna	2	-	2	-	1	1	2	1	2	2	2	2
"	femur	-	1	1	1	1	1	1	1	1	1	1	1
"	tibia	1	1	1	2	1	2	3	2	3	3	2	3
"	ulnar carpal	-	-	-	1	3	3	1	3	3	1	3	3
"	lunate	-	-	-	1	3	3	1	3	3	1	3	3
"	scaphoid	-	-	-	1	3	3	1	3	3	1	3	3
"	magnum	-	-	-	1	1	2*	1	1	2	1	1	2*
"	unciform	-	-	-	1	2	2	1	2	2	1	2	2
"	metacarpal	-	1	1	-	1	1	-	2	2	-	2	2
"	cuniform pes	-	-	-	2	2	2	2	2	2	2	2	2
"	navic. cuboid	-	-	-	1	2	2	1	2	2	1	2	2
"	calcaneum	-	-	-	2	-	2	2	-	2	2	-	2
"	astragalus	-	-	-	1	1	2*	1	1	2	1	1	2*
"	lat. malleo.	-	-	-	1	1	2*	1	1	2	1	1	2*
"	patella	-	-	-	1	2	2	1	2	2	1	2	2
"	metatarsal	-	-	-	1	1	2*	1	1	2	1	1	2*
"	phalanx-1st	-	-	-	5 or	5	1	5 or	5	1	5 or	5	1
"	phalanx-2nd	-	-	-	5 or	5	1	5 or	5	1	5 or	5	1
"	phalanx-3rd	-	-	-	1 or	1	1	1 or	1	1	1 or	1	1
"	mandible	1	3	3	-	1	1	1	4	4	1	4	4
"	skull			1			-			1			1
"	vertebrae			-			1			1			1
"	ribs			1			1			2			2
Odocoileus	scapula	-	-	-	-	2	2	-	2	2	-	2	2
"	humerus	-	-	-	-	1	1	-	1	1	-	2	2
"	radius	-	1	1	-	-	-	-	1	1	-	2	2
"	ulna	-	-	-	-	-	-	-	-	-	-	1	1
"	vertebrae			1			1			1			1
"	phalanx-2nd	- or	-	-	- or	-	-	- or	-	-	1 or	1	1
Lynx	humerus	-	-	-	-	1	1	-	1	1	-	1	1
"	skull			-			-			-			1
Cervus	phalanx-2nd	1 or	1	1	- or	-	-	1 or	1	1	1 or	1	1
"	antler	-	-	-	1 or	1	1	1 or	1	1	1 or	1	1
Castor	astragalus	-	-	-	-	2	2	-	2	2	-	2	2
"	tarsals	-	-	-	-	1	1	-	1	1	-	1	1
"	calcaneum	-	-	-	-	1	1	-	1	1	-	1	1
"	metatarsal	-	-	-	-	1	1	-	1	1	-	1	1
Ovis	ribs			1			1			1			1
"	phalanges	-	-	-	1 or	1	1	1 or	1	1	1 or	1	1
"	mandible	-	-	-	1	-	1	1	-	1	1	-	1

*The size difference between these two elements suggests that they came from two different animals.

teeth suggest that the juvenile bison at EgPr-2 were killed during October or November. The other juvenile bison tooth, Cat. No. 2711, is a fourth deciduous premolar. When its eruption-wear data are compared to that from the Casper site fossil bison (Wilson 1974:153), a November-December kill is suggested.

Table 25: Bison molar enamel heights, estimated ages, and minimum number of individuals based on teeth recovered from the Block Excavation

Cat. No.	Tooth	Side	Metaconid Height (mm)	Entoconid Height (mm)	Animal Age	Wear Type*	Location in Block Exc.	Animal Number
2711	dP^4	R	-	-	0.6	-	E of 40W	1
3890	M_2	R	-	-	1.5	2	W of 40W	2
3937	M_2	L	60.9	65.4	1.5	2	W of 40W	2
8460	M_1	L	-	-	4.5	8	E of 40W	3
8460	M_2	L	52.3	-	4.5	8	E of 40W	3
8460	M_3	L	62.0	68.1	4.5	9	E of 40W	3
3639	M_1	L	25.2	26.2	5-6	8	W of 40W	4
3639	M_2	L	45.9	46.6	5-6	8	W of 40W	4
3639	M_3	L	51.4	53.6	5-6	8	W of 40W	4
3291	M_1	R	23.9	25.0	5-7	8	W of 40W	5
3291	M_2	R	42.4	42.0	5-7	8	W of 40W	5
8141	P_{3-4}	L	-	-	9-10	-	E of 40W	6
8137	P_{2-4}	R	-	-	9-10	-	E of 40W	6
8137	M_1	R	13.2	18.9	9-10	8	W of 40W	6
8137	M_{2-3}	R	-	-	9-10	8,10	W of 40W	6
7410	P_3	R	-	-	13 plus	-	W of 40W	7
7410	M_2	R	9.9	13.6	13 plus	8	W of 40W	7
7410	M_3	R	-	-	13 plus	10	W of 40W	7
7416	P_4	R	-	-	13 plus	-	W of 40W	7
7410	M_1	R	8.0	10.4	13 plus	-	W of 40W	7

*(Reher and Frison 1980:65)

Non-dental evidence which supports the suggestion for a late fall or early winter occuption of the site is the complete absence of fetal remains or bones from very young calves. However, this absence may also be due to differential preservation, or to selective butchering-processing procedures used. The degree of epiphyseal fusion was examined on the bison bones and only in one case, an unfused distal tibial epiphysis, could it be suggested that the element came from an animal that was less than four and a half years old (Duffield 1973:132-139). Yet the dental evidence suggested the presence of three young bison among the remains at EgPr-2.

The evidence for determining the sex of the animals is quite tenuous. A measurement of 68.0 mm taken from below the third molar on the right portion of a bison mandible, Cat. No. 8137, suggests that a female is represented (Reher 1974:116-117; Reher and Frison 1980:70). The only other element recovered from the Sibbald Creek site from which an attempt was made to determine sex was a fairly intact metatarsal, Cat. No. 4903. It was measured according to the directions provided by Bedord (1974:199 and 239). The results were inconclusive as the readings fell between the minimum and maximum values that were used to determine sex categories.

CULTURAL MODIFICATION OF BISON REMAINS

Much of the faunal material recovered from the Sibbald Creek site was in a reduced state, most likely as a consequence of butchering of the carcasses and processing of the products. The many fragments of long bones found were, undoubtedly, the residue of raw marrow or bone grease extraction. An account of the possible cultural treatment of the various parts is presented below. Illustrations are included to indicate the type and locations of marks left during butchering.

One **skull** was recovered from the southwestern part of the Block Excavation. It is represented by almost one hundred small sinus fragments, both nasal bones, the frontal parted along the midline suture, and a tip and both basal sections of the horn cores (Figure 97). The edge preservation on the fragments was too poor to reveal whether the anterior breakage was the result of butchering or post-depositional pressures. There is no evidence to indicate if the brain had been removed by the hunters.

Most of the **mandible** fragments and disarticulated teeth were found in the western part of the Block Excavation. Reconstructed mandibles showed that the ventral border had been broken away, possibly in order to reach the pulp. One mandible (Figure 97 a) displayed cut marks on one side and a hammerstone mark on the buccal aspect. Two mandibles displayed damage at the dorsal end of the coronoid process. They may have been detached from the skull by smashing through the zygomatic arch. The cornua portion of a hyoid was recovered from the northcentral concentration of bones in the Block Excavation.

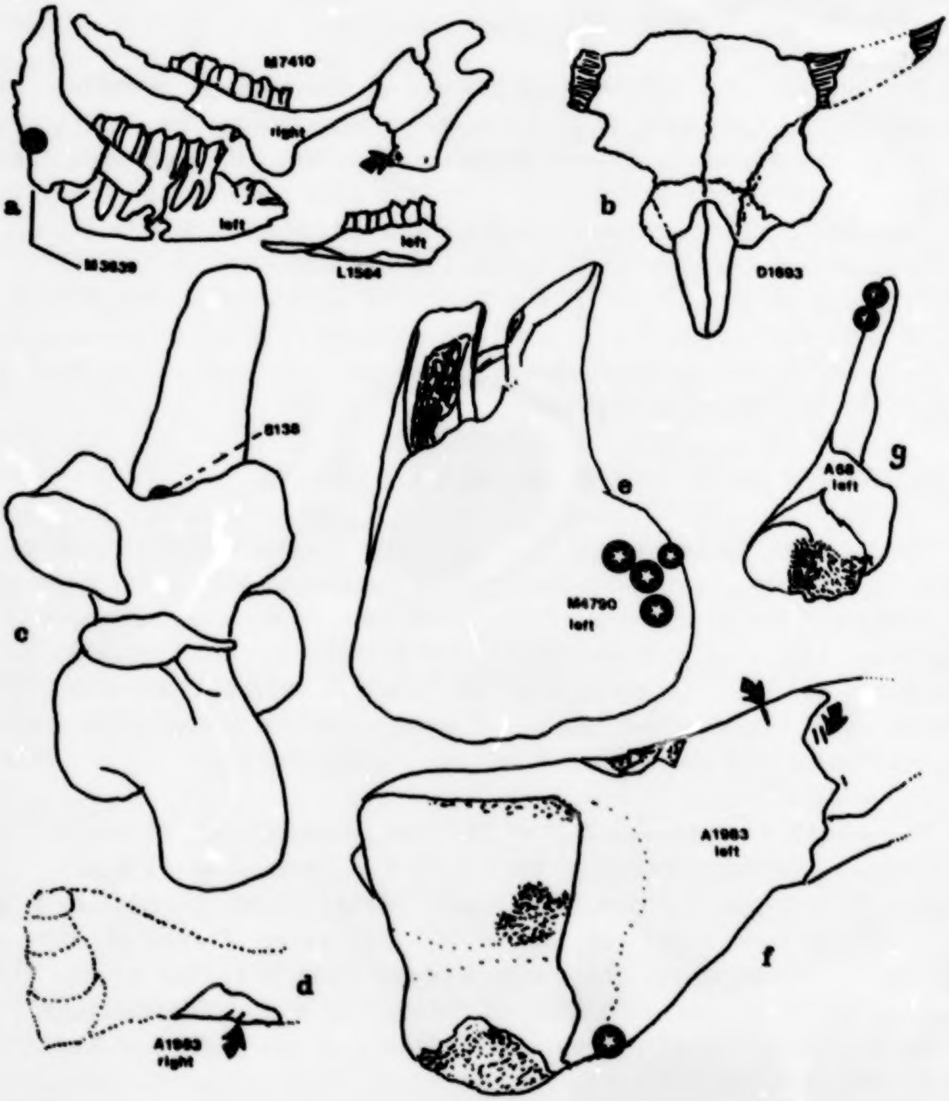

a
M7410
right
left
left
M3639
L1564
b
D1693
8138
c
e
M4790
left
g
A68
left
d
A1963
right
f
A1963
left

Figure 97: Bison bone showing butchering marks (arrows) and bone? chopper blows (stars), and a bison skull, all recovered from the excavations at EgPr-2. The letter preceeding the catalogue number of each element indicates the lateral, medial, dorsal, or anterior view. The large dot on the first example indicates that the hammerstone mark is on the side opposite the one illustrated. The drawings are not to scale.

Heavily damaged **vertebral** fragments from a bison seven or more years old were recovered from the main bone concentration in the central part of the Block Excavation. Posterior wings and articular surfaces of an atlas vertebra occurred, but no axis vertebrae were found. From the northcentral part of the Block Excavation came portions of the third to sixth cervical vertebrae, and nearby, the seventh cervical and three large thoracic fragments, tranverse and spinous processes, and five caudal vertebrae. Three distal caudal vertebrae were burnt white.

All processes on the larger vertebrae were broken. On three cervical and three thoracic examples the butchering appears to have been more forceful from the right than the left side. A depressed fracture at the base of the spinous process on one cervical vertebra, Cat. No. 8138, suggests that butchering was carried out with a fairly pointed tool. The dorsal spines on all the thoracic vertebrae were broken off.

Proximal **rib** fragments from at least two bison were found mixed with the vertebrae within the largest bone concentration. All but two were missing both the head and tubercle. Two small occurrences of rib heads, one containing three burnt examples, were found nearby. Sternal rib ends, one displaying possible chopping marks made by a stone tool, were recovered from the southwestern bone concentration.

Pieces of at least two **pelves** were found concentrated in the eastern half of the Block Excavation. The identifiable pieces consisted of two conjoining sections of the narrow part of the ilium, a part of the ilium wing, and several acetabulum fragments.

Two bison **scapulae** fragments comprising a part of the costal border and medial side along with the nutrient foramen, and a section of the glenoid process, were recovered from the two major bone concentrations. In addition, two pieces of a right scapula which is well within the range of bison were recovered from the excavations. No convincing tool marks were noticed on any of the fragments.

Humeri fragments representing at least five, and possibly as many as eight, bison were discovered at EgPr-2. All identified humeri comprised distal epiphyseal or shaft pieces. The proximal sections may have been destroyed during marrow extraction. Convincing butchering marks were observed on a number of humeri. On one example which consisted of the left epiphysis and conjoining shaft portions,the medial side proximal to the anteriormost level of the medial condyle had been removed by a blow directed by a sharp object downward against the distal end (Figure 97 f). Two probable cut marks were noticed on the medial side just below the internal tuberosity, and another one was present directly adjacent on the posterior side. Another humerus, Cat. No. 1983 (Figure 97 d), displayed cut marks at the intersection of the medial and anterior sides, just proximal to the level of the nutrient foramen. The distal end of a left humerus, Cat. No. 4790 (Figure 97 e), bore several depressions on the medial side of the condyle which suggest that it had been struck with some force by a blunt tool.

Proximal and distal ends of **radii** from at least three, and possibly four bison were found at the excavations. It was not possible to reassemble any complete radii. There were three instances where the radii could be articulated with carpal elements (Table 23). Examples of radii bearing butchering marks are illustrated in Figure 98. One fragment, Cat. No. 4588 (Figure 98 b), exhibits impact marks left by a round, pointed object on the posterior surface near the ulnar groove. Two similar impressions were present on the anterior side about a decimeter from the proximal end (Figure 98 c) and a cut mark was observed on the medial side of the shaft. A proximal portion, Cat. No. 3479 (Figure 98 a), exhibited a cut mark on the anterior side and a transverse nick which extended across the same side immediately above the break. Perhaps these marks were made when the biceps and other muscles were severed.

Portions of **ulnae**, three of which may be from bison, were found at EgPr-2. In the cases where the semi-lunar notch area was present the posterior border beyond this point was missing. Only one example displayed butchering marks, and this was a round depression that may have been caused by a hammer blow to the proximal end (Figure 98 d).

Bison **carpal** bones from at least four limbs were recovered from the eastern part of the Block Excavation. Most of them were rearticulated with other carpal elements (Table 23). Two proximal articular ends and several shaft fragments from bison **metacarpals** came from the excavations. No cut marks were visible on any of the metacarpal fragments. The identification of three first, a second, and one third bison **phalanges** reflect the paucity of lower front limbs recovered from EgPr-2. None of the phalanges bore visible butchering marks.

All the bison **femora** retrieved from the Sibbald Creek site consisted of pieces comprising shaft fragments, parts of two heads, and one medial condyle. Proximal end fragments were rare. The extremely reduced state of the femora is likely a consequence of marrow extraction or bone grease preparation.

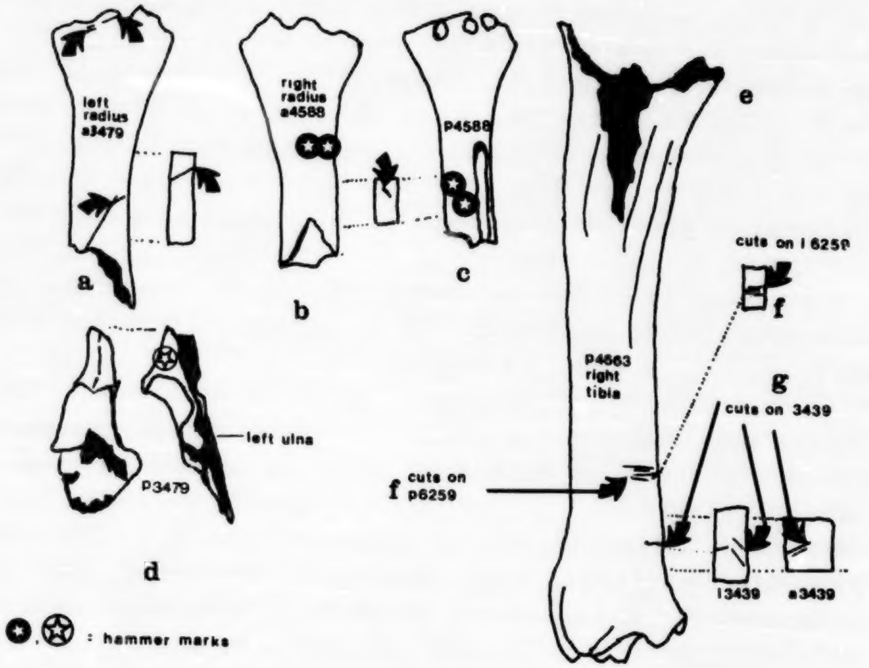

left radius a3479
a
right radius a4588
b
P4588
c
left ulna
P3479
d
e
P4663 right tibia
cuts on l 6259
f
g
cuts on 3439
f cuts on p6259
l3439
a3439
: hammer marks

Figure 98: Examples of butchering marks observed on bison leg elements recovered from EgPr-2. The large tibia fragment (e) did not display cut marks; it is used as a model to illustrate the location of damage seen on the small tibia fragments. The aspects of the element (anterior, posterior, lateral and medial) are identified before the catalogue number of each specimen.

Four distal ends and numerous shaft fragments of bison **tibias** representing a minimum of three, and probably six individuals, were found in the excavations. Four examples were represented by a good proportion of the medial side of the shaft. No proximal articular epiphyses were recognized among the remains. Several tibias exhibited cut marks on the lateral, posterior and anterior aspects of the shaft (Figure 98 f and g).

Tarsal bones from at least two bison were recovered from the eastern part of the Block Excavation. In two instances it was possible to reassemble tarsal elements with bison tibias (Table 23). One naviculo-cuboid, Cat. No. 6482, displayed probable cut marks on the border between the lateral and posterior sides which might have been produced by a sharp stone tool during the detachment of the metatarsal.

Three bison **patellas** discovered in the eastern side of the Block Excavation all evidenced damage on the anterior-medial border such as that which might have been imposed by chopping. It is likely that they were brought back to the campsite still attached to the hind leg muscles.

A proximal portion and a complete example of bison **metatarsals** recovered from the Block Excavation were reassembled with other hind leg elements (Table 23). Several shaft fragments were also found, but it could not be determined if they were from bison. Two probable hind leg bison **first phalanges** were discovered in the eastern part of the Block Excavation. Seven bison **sesamoids** occurred close by. None of the metatarsal pieces or phalanges showed any butchering marks.

CULTURAL MODIFICATION OF NON-BISON REMAINS

Bones of animals other than bison retrieved from the Sibbald Creek site included vertebrae, a scapula, a humerus, a radius and ulna, and a phalanx from deer, the hind leg of one beaver and a calcaneum of a second individual, a humerus and skull from a lynx, two elk phalanges, and a mandible, two ribs and a first and second phalanx from a Rocky Mountain sheep (Table 24). Not all of the elements bore marks left during butchering or processing; those which did appeared to clearly reflect damage created by steel tools.

One large tine and 26 small fragments of a poorly preserved **elk antler**, Cat. Nos. 6686 and 8169, were found in the 0-5 cm layer in the northeast section of the Block Excavation. It is likely that the antler was shed in the wild and brought back to camp by hunters to be used for tools. No convincing cut marks were noticed on the fragments.

Deer vertebral remains consisting of two anterior thoracic centrum epiphyses, a lateral transverse process from a lumbar vertebra, and portions of an atlas vertebra were recovered from EgPr-2. Crushing evident along one broken edge suggests that the atlas vertebra had been smashed with a chopper. An indentation at the posterior border of the lumbar vertebra process suggests that this piece may have been detached with a dull edged stone of bone tool.

Two right **deer scapulae** represented by the diaphysis area which included the posterior border and nutrient foramen came from the site. Both fragments showed deep, even cut marks distal to the nutrient foramen which, unquestionably, were made by a sharp edged metal tool (Figure 99 d).

The proximal section of a **deer humerus** was discovered in the Block Excavation while a shaft portion of possibly the same element was found on the bulldozed surface a few meters to the south. Bipolar impact scars present on the anterior and posterior aspects of the shaft suggest breakage by the hammer and anvil method. No cut marks were visible on the proximal portion.

Another **deer humerus** fragment, Cat. No. 1367, comprising of a shaft portion and the completely fused distal articular epiphysis articulated with the **radius and ulna** proximal sections discovered east of the Block Excavation (Table 23). The radius displayed steel tool cut marks on the posterior side above the nutrient foramen, on the anterior part of the shaft, and on the medial side at the proximal end. Judging from the depth and straightness of the cut, it appears that the radius had been severed by an axe blow on the anterior side. The radius also displayed a steel tool cut mark on the posterior side of the distal end. The proximal portion of a second **deer radius** was discovered immediately west of the Block Excavation. It is described below under bone tools.

The shaft portion, minus the proximal and distal articular epiphyses, of a **lynx humerus** was recovered from the eastern section of the Block Excavation. A small cut mark, probably made by a steel blade, was observed on the medial aspect of the posterior side near the distal end of the shaft.

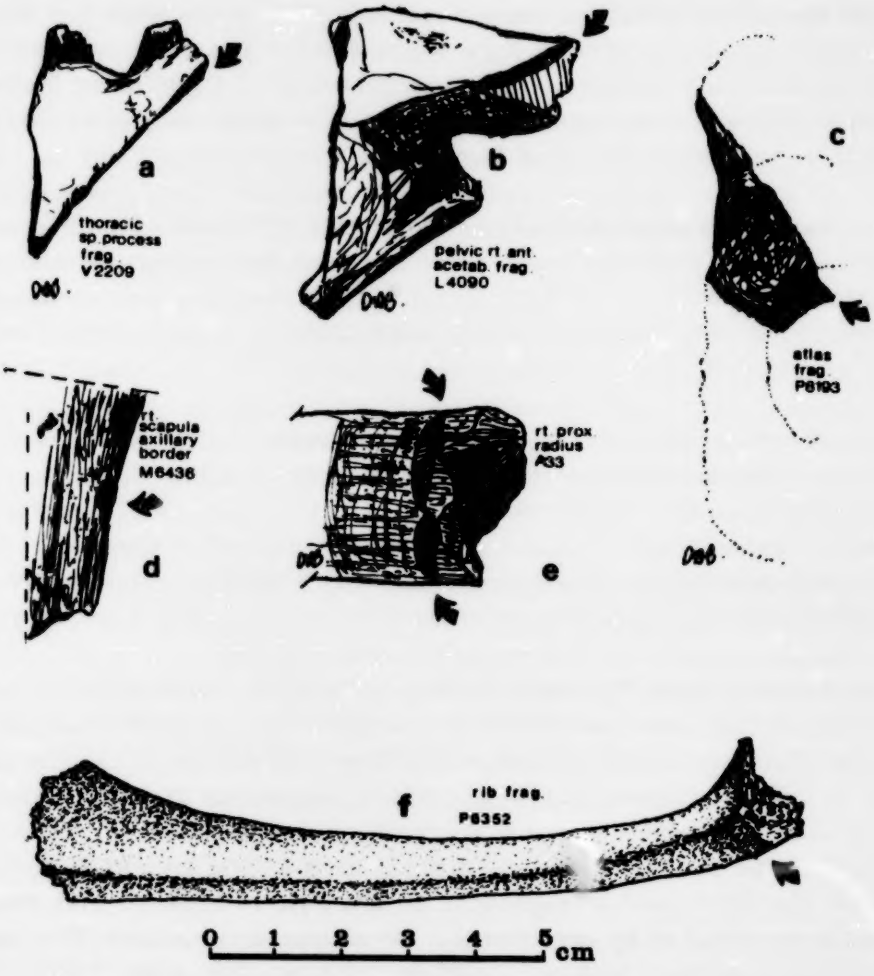

a
thoracic
sp. process
frag.
V2209
DAB.
b
pelvic rt. ant.
acetab. frag.
L4090
DAB.
c
atlas
frag.
P8193
DAB.
rt.
scapula
axillary
border
M6436
d
rt prox.
radius
A33
DAB
e
f
rib frag.
P6352
0
1
2
3
4
5
cm

Figure 99: Skeletal remains from EgPr-2 that show evidence of steel tool damage. Arrows point out hatchet or axe cut marks. The ventral, lateral, medial or posterior aspects of the element are indicated by the letter which preceeds the catalogue number. The atlas vertebra (c) is not to scale.

Two **Rocky Mountain sheep rib** fragments, Cat. Nos. 6352 and 7506, were recovered from the upper levels of the Block Excavation. The first example displayed on the posterior side a deep planar cut undisputably made by a steel tool (Figure 99 f). The second rib fragment consisted of a proximal section. It displayed a deep, narrow steel tool cut mark extending from the posterior to the lateral sides immediately below the head (Figure 100 a).

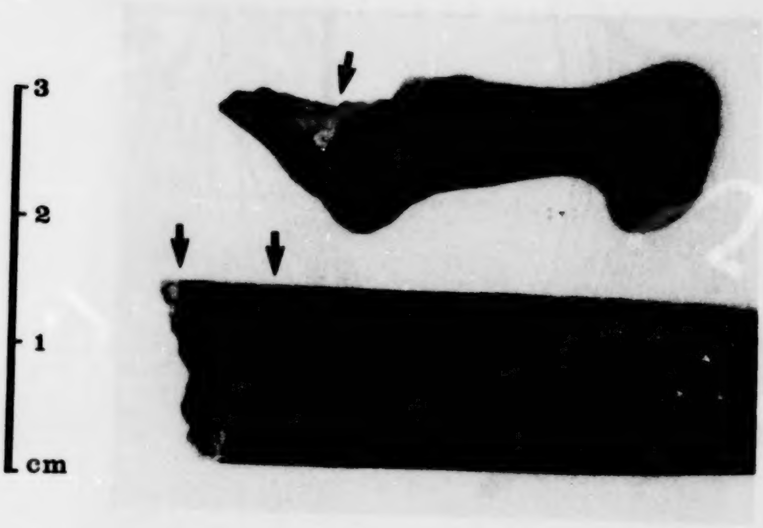


Figure 100: The head of a sheep rib (Cat. No. 7560) showing a cut made by a steel knife (arrow) and the medial portion of a rib from a large mammal (Cat. No. 2141) illustrating two steel tool cut marks.

A **Rocky Mountain sheep mandible** fragment, Cat. No. 1564, was retrieved from the southwestern part of the Block Excavation. The element was represented only by the portion below the P_3 - M_2 teeth. It could not be determined how the posterior and anterior sections had been removed.

BONE TOOLS FROM THE SIBBALD CREEK SITE

One fairly convincing example of an awl and two other questionable implements comprise the bone tools recovered from the Sibbald Creek site. Had the general condition of the bone been better then addititional tools might perhaps have been identified.

Awl

A proximal section of a right deer radius appears to have been deliberately pointed and may have served as an awl. The tool (Figure 101) is rectangular in cross section and tapers to a point at one end. The end of the radius from which the piece broke off could have offered a suitable handle. Minute, parallel striae circle the internal aspect of the tapering end. This probable tool was recovered from the 5-10 cm level in the northeast quadrant of unit 13N 44W. It measures 12.1 cm in length and varies between 0.5 and 1.0 cm in thickness.

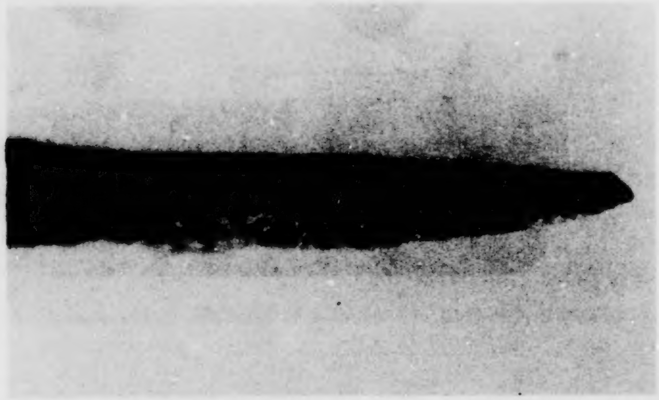


Figure 101: A close-up view of the tip of a possible bone awl (Cat. No. 2074).

Humerus Flesher?

A questionable flesher made from a humerus shaft, Cat. No. 4858 (Figure 102 c), was recovered in two pieces from the 5-10 cm level in the northwest quadrant of unit 15N 37W. The humerus is from some animal larger than a deer. The possible working edge is slightly damaged but displays either deliberate or unintentional beveling and a slight indication of polish.

Metacarpal Chopper?

One proximal portion of a bison metacarpal, reassembled from two fragments, Cat. Nos. 4851 and 3745 (Figure 102 a and b), was recovered with articulating front leg bones in the vicinity of the large bone concentration in the northwest quadrant of unit 15N 37W within the

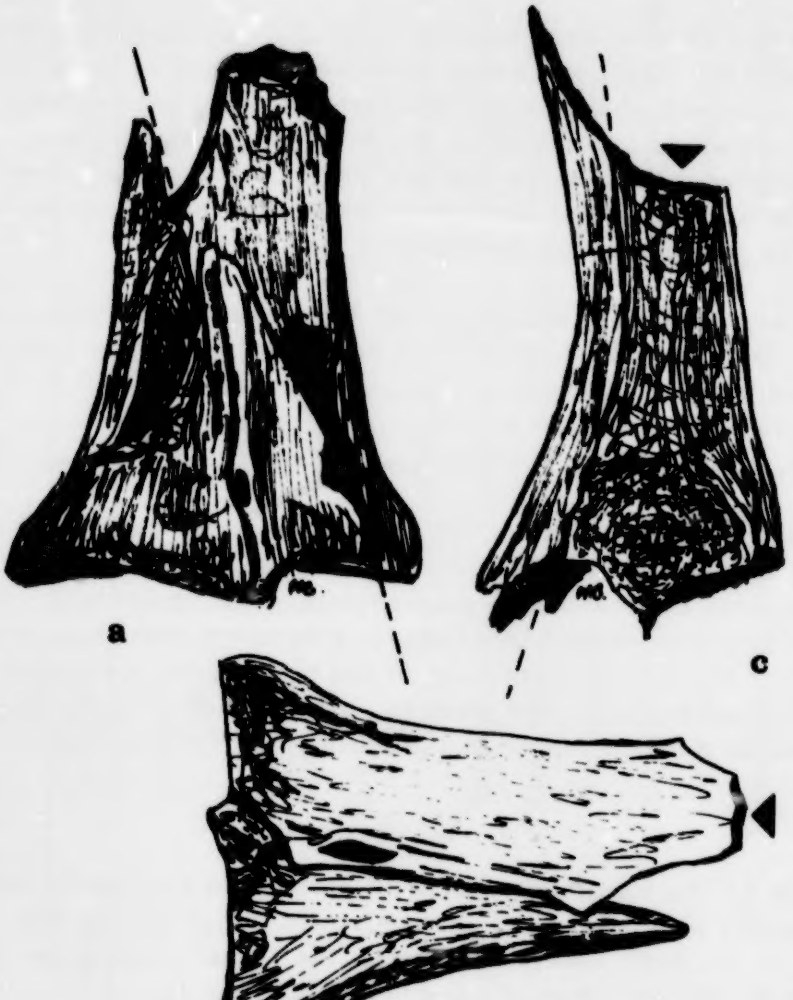


Figure 102: Probable bone tools from the Sibbald Creek site. Included are two aspects of a metacarpal chopper (a and b) and a possible humerus flesher (c). Arrows indicate tool edges that reflect wear.

Block Excavation. At least two flakes were detached from the exterior surface. Whether this occurred when, or even if the metacarpal was used as a chopper, is open to question.

STEEL TOOL MARKS ON THE FAUNAL REMAINS FROM EgPr-2

The faunal remains were examined visually and further checked with a 10X hand lens. Steel cut marks were distinguished by their smooth, even, and sometimes deep, incisions which are quite unlike those that one would expect to be created by the more jagged-edged quartzite or siltstone implements. The deeper cuts are believed to have been made by chopping with an axe or hatchet, or perhaps by a large knife similar to the badly rusted example described in PART VI.

Marks unquestionably made by steel tools were almost entirely restricted to animals other than bison (Table 26). The few instances where bison bone was thought to display marks caused by steel tools are questionable either in terms of the animal species represented (Figures 99 a and b, and 101 b), or the origin of the mark (Figure 99 c).

The fact that, unlike stone and bone implements, metal ones were only available at Sibbald Creek during the historic period, makes bones displaying steel tool cut marks good chronological indicators. The absence of any convincing bison remains displaying steel tool marks suggests that these bones date back to the prehistoric occupation of the site. It further suggests that when the historic period occupation occurred bison were no longer in the vicinity of Sibbald Flat.

SUMMARY

Because of the significance of wild animals in the subsistence economy of the prehistoric and early historic Indian groups who occupied the southern Alberta Foothills, the faunal remains recovered from EgPr-2 were examined in some detail.

Overall, preservation of bone material at the Sibbald Creek site was quite poor. Most of the faunal remains were recovered from the upper 10 centimeters of the Block Excavation, while only a few elements were found either below this level or outside the area. In the lower two thirds of the deposits, only bits of calcined bone were recovered.

Distribution maps illustrating the horizontal and vertical occurrences of faunal remains were included to aid interpretation. Where possible, skeletal elements and units of articulating elements

Table 26: Skeletal remains from EgPr-2 displaying steel tool damage.

Cat. No.	Provenience	Element	Species	Type Of Mark
7669	17N 34W SE 0-5	scapula	(*Odocoileus*)	chopped (hatchet)
6436 2744	16N 36W NE 0-5	scapula	(*Ococoileus*)	chopped (hatchet)
1367	terrace slope, surface	humerus	(*Odocoileus*)	linear (knife or axe)
33	12N 24W NE 0-5	radius	(*Ococoileus*)	chopped (hatchet)
33	12N 24W NE 0-5	ulna	(*Odocoileus*)	linear (knife or axe)
6346	16N 36W SE 0-5	humerus	(*Lynx*)	chopped (axe or knife)
6352	16N 36W SE 5-10	first rib	(*Ovis canadensis*)	chopped (hatchet)
7506	16N 41W NW 0-5	rib, proximal fr.	(*Ovis canadensis*)	linear (knife)
2141	14N 27W SW 0-5	rib shaft frag.	unidentified	chopped (hatchet)
8193	17N 37W SW 0-5	atlas vertebra	(*Bison*)	chopped (axe?, shovel?)
2209	14N 29W NW 0-5	thoracic fragment	unidentified	chopped (hatchet)
4090	15N 34W SE 0-5	pelvic fragment	unidentified	chopped (hatchet)

were reassembled in order to determine the vertical or horizontal dispersion of the remains and to identify patterns of butchering and processing. The impressions imposed by bone or stone tools and steel implements on many bone fragments comprised one of the main criteria by which two different periods of native occupation of the Sibbald Creek site were distinguished.

The most common faunal remains at EgPr-2 were those from bison. On the basis of the dental remains at least seven individual bison were identified. Because the marks on the identifiable bison elements appear to have been exclusively made by bone or stone tools, the remains are thought to have been left behind by prehistoric occupants. The close horizontal association of the bison bone concentrations and Plains Side-Notched projectile points suggests that these faunal remains date to Late Prehistoric Period use of the site.

Bones of other animals were also recovered. They were indicative of a minimum of two deer, one mountain sheep, one elk, two beaver, and a lynx. The butchering and processing marks observed on many of these elements are similar to those made by steel knives or axes. In some respects, the pattern of butchering, particularly the apparent practice of breaking the mandible and long bones, possibly for the extraction of marrow, was similar to that witnessed among the bison remains. The tentative conclusion reached was that many of the non-bison remains could be attributed to historic Indian use of the site. Diagnostic historic period artifacts found at EgPr-2 suggest that the period of historic Indian or Metis use probably occurred between 1850 and the 1880s. The absence of any bison bones bearing convincing marks left by steel implements is a suggestion that the historic Indian occupation may have taken place after the demise of the buffalo in the early 1880s.

The two concentrations of bison bones uncovered in the Block Excavation served as the primary source of information on the prehistoric butchering and processing procedures recognized at EgPr-2. From the occurrence of certain skeletal elements, it appears that the north-central concentration was an area where choice cuts may have been processed. The cuts may have included the meat which accompanied the patella handhold muscle attachments and the tissue found along the spine and rib sections. The bison spinal column discovered at this locality included most of the cervical and the first four or five thoracic vertebrae, plus most of the ribs from at least one side. Ribs from the other side of the spinal unit were also found nearby. Whether they had been attached at the site of the kill and brought back as a separate butchering unit or part of a larger one is simply a matter of speculation. The occurrence of fragments from a mandible and hyoid in this processing area is a suggestion that perhaps the tongue may have been removed here.

To the south of the vertebral-rib unit were discovered sternal remains indicating that perhaps the brisket had been consumed here. The few lumbar vertebra pieces, including the transverse process which was recovered near the spinal section, may have been connected to the sub-lumbar muscles which formed the vertebral-rib unit mentioned above. The recovery of limb elements from the central part of the Block Excavation reflects the fact that this was an area where appendicular portions of the skeleton may have been processed.

Fewer faunal element types were found in the other bone concentration located in the southwestern part of the Block Excavation. The temporal or horizontal relationships of these remains to those from the major central concentration could not be determined. They may relate to separate occupation events, or represent different activity areas of the same occupation episode. Mandibular remains were quite conspicuous in the region between the central and the southwestern parts of the Block Excavation. They may or may not connect with the faunal remains from either concentration.

Most of the pelvic fragments came from the eastern part of the Block Excavation. One pelvic fragment from a large unidentified animal might have been cut with a metal implement (Figure 99 b).

Many of the hunting, butchering, and processing patterns suggested by the faunal remains recovered from the upper levels of the Sibbald Creek site, including the heavy or exclusive reliance upon bison, the taking of single animals, the bringing back to camp of the more practical cuts of muscles, the breaking up of the larger elements for their marrow, the use of stone or bone tools in the butchering and processing operations, and the littering of the habitation site with refuse, might have been repeated many times during the earlier history of the Sibbald Creek site.

BIBLIOGRAPHY

Alley, N.

1972 *Quaternary history of part of the Foothills of the Rocky Mountains, and western Porcupine Hills in southwestern Alberta*. Unpublished Ph. d. dissertation. University of Calgary, Calgary.

Ball, Bruce F.

1983 Radiocarbon age estimates from the Sibbald Creek site, EgPr-2. In "Archaeology in Alberta, 1982". Compiled by David Burley. *Archaeological Survey of Alberta Occasional Paper* No. 21. Alberta Culture, Edmonton. pp. 177-185.

Barnett, Donald A.

1981 *Inventory of identified mammal remains from EgPr-2.* Unpublished report submitted to the Archaeological Survey of Alberta as part of Archaeological Agreement 80-114.

Bedord, J. N.

1974 Morphological variation in bison metacarpals and metatarsals. In *The Casper site: a Hell Gap bison kill on the High Plains.* Edited by George C. Frison. Academic Press, New York. pp. 191-197.

Beach, H. H.

1943 Moose Mountain and Morley map-areas, Alberta. Canada Department of Mines and Resources, *Geological Survey of Alberta Memoir* 236.

Benedict, James B.

1978 Excavations at the Hungry Whistler site. In "The Mount Albion Complex: a study of prehistoric man and the Altithermal". By James B. Benedict and Byron L. Olson. *Center for Mountain Archaeology Research Report* No. 1. Ward, Colorado. pp. 1-75.

Brink, Jack

1979 Preliminary report on archaeological investigations in the eastern slopes of Alberta, 1978. In "Archaeology in Alberta, 1978". Compiled by J. M. Hillerud. *Archaeological Survey of Alberta Occasional Paper* No. 14. Alberta Culture, Edmonton. pp. 79-85.

Brown, C. L. and C. E. Gustafson

1979 A key to post-cranial skeletal remains of cattle/bison, elk and horse. *Laboratory of Anthropology Reports of Investigations* No. 57. Washington State University, Pullman, Washington.

Byrne, William J.

1973 The archaeology and prehistory of southern Alberta as reflected in ceramics. *National Museum of Man Mercury Series* No. 14, Ottawa.

Calderon, W. Frank

1936 *Animal painting and anatomy*. Reprinted in 1975 by Dover Publications, Inc., New York.

Campling, N. R.
1980 Identification of Swan River chert. In Directions in Manitoba prehistory: papers in honour of Chris Vickers. Edited by Leo Pettipas. Association of Manitoba Archaeologoists and Manitoba Archaeological Society, Winnipeg. pp. 291-299.

Chopping, George C.
1978 Bottles of the Canadian Prairies. George C. Chopping, Spy Hill, Saskatchewan.

Christensen, Ole A.
1971 Banff prehistory: prehistoric subsistence and settlement in Banff National Park, Alberta. Unpublished M. A. thesis. University of Calgary.

Dempsey, Hugh A.
1972 Crowfoot, chief of the Blackfeet. With a foreward by Paul Sharp. Hurtig Publishers, Edmonton.

Doll, Maurice F. V.
1982 The Boss Hill site (FdPe-4) Locality 2: Pre-Archaic manifestations in the Parkland of central Alberta, Canada. Provincial Museum of Alberta Human History Occasional Paper No. 2. Alberta Culture, Edmonton.

Driver, Jonathan C.
1978 Holocene man and environments in the Crowsnest Pass, Alberta. Unpublished Ph. D. thesis. University of Calgary, Calgary.

Duffield, L. F.
1973 Aging and sexing the post-cranial skeleton of bison. Plains Anthropologist 18 (60):132-139.

Dyck, Ian G.
1977 The Harder site: a Middle Prehistoric bison hunter's campsite in the Northern Great Plains. National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 67. Ottawa.

Environment Conservation Authority
1972 The conservation of historical and archaeological resources in Alberta: report and recommendations. Environment Conservation Authority, Dr. W. R. Trost, Chairman, Edmonton.

Espenshade, Edward B., editor
1970 Goode's world atlas. Rand McNalley and Company, Chicago.

Eyman, Frances
1973 The quartzite tools at Gull Lake and their use at bison drives. In "The Gull Lake site: a prehistoric bison drive site in southwestern Saskatchewan". Milwaukee Public Museum Publications in Anthropology and History No. 1. NAPCO Graphic Arts, Inc., New Berlin, Wisconsin.

Fitting, James E., Jerry Devisscher and Edward J. Wahla
1966 The Paleo-Indian occupation of the Holcombe Beach. University of Michigan Museum of Anthropology, Anthropology Papers No. 27. Ann Arbor.

Forbis, Richard G.
1962 The Old Women's buffalo jump, Alberta. National Museum of Canada, Bulletin 180, Contributions to Anthropology, 1960. Ottawa. pp. 57-123.

1968 Fletcher: a Paleo-Indian site in Alberta. American Antiquity 33 (1):1-10.

Frison, George C.
1970 The Glenrock buffalo jump, 48 CO 304. Plains Anthropologist 15 (50): Part 2, Memoir 7.

1974 Archaeology of the Casper site. In The Casper site: a Hell Gap bison kill on the High Plains. Edited by George C. Frison. Academic Press, New York.

1978 Prehistoric hunters of the High Plains. Academic Press, New York.

Frison, George C. and Donald C. Grey
1980 Pryor Stemmed: a specialized Paleo-Indian ecological adaptation. Plains Anthropologist 25 (87):27-46.

Geochron Laboratories
1982 Radiocarbon age determination report of analytical work. Form statement accompaying radiocarbon results sent to the Archaeological Survey of Alberta by Geochron Laboratories Division of Krueger Enterprises, Inc. of Cambridge, Massachusetts.

Gilbert, B. M.
1973 Mammalian osteo-archaeology: North America. Edited by D. R. Evans. Special Publications of the Missouri Archaeological Society. University of Missouri, Columbia.

Gordon, Bryan H. C.
1979 Of men and herds in Canadian Plains prehistory. National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 84. Ottawa.

Government of Alberta, and University of Alberta
1969 Atlas of Alberta. University of Alberta Press, Edmonton.

Gramly, Richard Michael, and Kerry Rutledge
1981 A new Paleo-Indian site in the state of Maine. American Antiquity 46 (2):354-360.

Grinnell, G. B.
1962 Blackfoot lodge tales. University of Nebraska Press, Lincoln.

Gruhn, Ruth, and Alan Lyle Bryan

1977 Los Tapiales: a Paleo-Indian campsite in the Guatemalan Highlands. *Proceedings of the Philosophical Society* 121 (3):235-237.

Gryba, Eugene M.

n. d. Three radiocarbon dates from the Sibbald Creek site. Short paper accepted for publication in a forthcoming issue of *The Calgary Archaeologist*.

1976a The Hill sites: two surface sites in the Swan Valley, Manitoba. *Na'pao* 6 (1 and 2):21-40.

1976b The early side-notched component at site DjOn-26. In "Archaeology in Alberta, 1975". Compiled by J. Michael Quigg. *Archaeological Survey of Alberta Occasional Paper* No. 1. Alberta Culture, Edmonton. pp. 92-107.

1980a Highway archaeological survey of southern Alberta, 1979, Permit Number 79-68. In "Archaeology in Alberta, 1979". Compiled by Paul F. Donahue. *Archaeological Survey of Alberta Occasional Paper* No. 15. Alberta Culture, Edmonton. pp. 71-74.

1980b Salvage archaeology along Jumpingpound Creek, Permit Number 79-148. In "Archaeology in Alberta, 1979". Compiled by Paul F. Donahue. *Archaeological Survey of Alberta Occasional Paper* No. 15. Alberta Culture, Edmonton. pp. 162-168.

1980c *Archaeological mitigation along SR 554 in the Jumpingpound Creek Valley.* A Final Report submitted to the Archaeological Survey of Alberta as part of Archaeological Agreement 79-148.

1980d *Highway archaeological survey (south), 1979.* A Final Report submitted to the Archaeological Survey of Alberta as part of Archaeological Agreement 79-68.

Heitzmann, Roderick J., John Priegert and Shirleen S. Smith

1981 Alberta highways south survey historical resources assessment program 1980, Permit 80-96-C. In "Archaeology in Alberta, 1980". Compiled by Jack Brink. *Archaeological Survey of Alberta Occasional Paper* No. 17. Alberta Culture, Edmonton. pp. 12-25.

Hester, James J.

1962 A Folsom lithic complex from the Elida site, Roosevelt County, New Mexico. *El Palacio* 92 (2):92-111.

Holbrook, Stewart H.

1959 *The golden age of quackery.* MacMillan, New York.

Hume, Ivor Noel

1969 A guide to artifacts of colonial America. Alfred A. Knopf, New York.

Irwin, Henry T. and H. M. Wormington

1970 Paleo-Indian tool types in the Great Plains. American Antiquity 35 (1):24-34.

Jackson, L. E., Jr.

1977 Quaternary stratigraphy and terrain inventory of the Alberta portion of the Kananaskis Lakes 1:250,000 sheet (82-J). Unpublished Ph. D. disseration. University of Calgary, Calgary.

1979 Important new evidence for the existence of an ice-free corridor in the Rocky Mountain Foothills near Calgary, Alberta, during the Late Wisconsin times. In "Current Research, Part A", Geological Survey of Canada Paper 79-1A. pp 107-111.

1980 Glacial history and stratigraphy of the Alberta portion of the Kananaskis Lake map area. Canadian Journal of Earth Sciences 17 (4):459-477.

Johnston, A.

1969 Man's utilization of the flora of the Northwest Plains. In Post-Pleistocene man and his environment on the Northern Plains. Edited by R. G. Forbis, L. B. Davis, O. A. Christensen and G. Fedirchuk. The Student's Press, University of Calgary, Calgary. pp. 109-177.

Kehoe, Alice B.

1978 Francois' house: an early historic fur trade post on the Saskatchewan River. Manuscript Series in Archaeology and History, Pastlog No. 2. Saskatchewan Culture and Youth, Regina.

Kehoe, Thomas F.

1966 The distribution and implications of fluted points in Saskatchewan. American Antiquity 31 (4):530-539.

1973 The Gull Lake site: a prehistoric bison drive site in southwestern Saskatchewan. Milwaukee Public Museum Publications in Anthropology and History No. 1. NAPCO Graphic Arts., Inc., New Berlin, Wisconsin.

Kidd, Kenneth E. and Martha A. Kidd

1970 A classification system for glass beads for the use of field archaeologists. Occasional Papers in Archaeology and History No. 1. Canadian Historic Sites, Ottawa.

Lawrence, B.

1951 Post-cranial skeletal characteristics of deer, pronghorn, and sheep-goat, with notes on bos and bison. Paper of the Peabody Museum of Archaeology and Ethnology 53 (3):9-43.

Leonhardy, Frank C. and Adrian D. Anderson
1966 The archaeology of the Domebo site. In "Domebo: a Paleo-Indian mammoth kill in the Prairie-Plains". Edited by Frank C. Leonhardy. Contributions of the Museum of the Great Plains No. 1. Lawton, Oklahoma. pp. 14-26.

Longley, Richard W.
1967 Climate and weather patterns. In Alberta, a natural history. W. G. Hardy, Editor-in-chief. M. G. Hurtig, Publishers, Edmonton. pp. 53-67.

MacDonald, George F.
1968 Debert: a Paleo-Indian site in central Nova Scotia. National Museum of Canada Anthropology Papers No. 16. Ottawa.

MacDonald, Glen Michael
1980 The post-glacial paleoecology of the Morley Flats and Kananaskis Valley region, southwestern Alberta. Unpublished M. Sc. thesis, University of Calgary, Calgary.

1982 Late Quaternary paleoenvironments of the Morley Flats and Kananaskis Valley of southwestern Alberta. Canadian Journal of Earth Sciences 19 (1):23-35.

McIntyre, Michael L. and B. O. K. Reeves
1975 Archaeological Investigations: Lake Minnewanka site (EhPu-1). Report on file with Parks Canada Western Region Office, Calgary.

Miller, Susanne J. and Wakefield Dort
1978 Early Man at Owl Cave: current investigations at the Wasden site, eastern Snake River Plain, Idaho. In "Early Man in America". Edited by Alan Lyle Bryan. Occasional Paper No. 1 of the Department of Anthropology, University of Alberta. Archaeological Researchers International, Edmonton. pp. 129-139.

Morgan, Grace R.
1980 Bison movement patterns on the Canadian Plains: an ecological analysis. Plains Anthropologist 25 (88):143-160.

Olinyk, Dave
1978 Ceramic vessel orifice analysis. Archaeofacts 6 (1):14-21.

Poliquin, W. H.
1968 Some climatic data for the east slopes of the Rockies in Alberta. Eastern Rockies Forest Conversation Board Management Report No. 2. Calgary, Alberta.

Quigg, J. Michael
1976 A note on the Fletcher site. In "Archaeology in Alberta, 1975". Compiled by J. Michael Quigg and W. J. Byrne. Archaeological Survey of Alberta Occasional Paper No. 1. Alberta Culture, Edmonton. pp. 108-109.

Reeves, Brian O. K.

1966 *The Kenney site: a stratified campsite in southwestern Alberta.* Unpublished M. A. thesis. University of Calgary, Calgary.

1970 *Culture change in the Northern Plains 100 B. C. - A. D. 1000.* Unpublished Ph. D. dissertation. University of Calgary, Calgary.

1973 The nature and age of the contact between the Laurentide and Cordilleran ice sheets in the western interior of North America. *Arctic and Alpine Research* 5 (1):1-16.

Reeves, Brian O. K. and J. Dormaar

1972 A partial pedological and archaeological report from the southern Alberta Rocky Mountains. *Arctic and Alpine Research* 4 (4):325-336.

Reher, Charles A.

1974 Population studies of the Casper site bison. In *The Casper site: a Hell Gap bison kill on the High Plains.* Edited by George C. Frison. Academic Press, New York. pp. 113-124.

Reher, Charles A. and George C. Frison

1980 The Vore site, 48CK3[illegible], a stratified buffalo jump in the Wyoming Black Hills. *Plains Anthropologist* 25 (88), *Memoir* 16.

Reimchen, T. H. F. and L. A. Bayrock

1977 *Surficial geology and erosion potential Rocky mountains and the Foothills of Alberta.* Report prepared for Alberta Environment. Bayrock and Reimchen Surficial Geology Limited, North Vancouver, British Columbia.

Ritchie, J. C.

1976 The late-Quaternary vegetation of the western interior of Canada. *Canadian Journal of Botany* 54 (15):1793-1818.

Salt, W. R. and A. L. Wilk

1958 *The birds of Alberta.* Queen's Printer, Alberta.

Simpson, G.

1847 *Narrative of a journey around the world in the years, 1841 and 1842.* H. Colburn, London.

Sisson, S. and J. D. Grossman

1975 *The anatomy of domestic animals, Vol. 1.* Edited by R. Getty. W. B. Saunders, Philadelphia.

Skeels, Lydia Lowndes Maury

1967 *Location of the Indian tribes at first white contact in Alberta, Canada.* Unpublished M. A. thesis, University of Calgary, Calgary.

Soper, J. D.
1964 The mammals of Alberta. Queen's Printer, Edmonton.

Stalker, A. M. and J. E. Harrison
1977 Quaternary glaciation of the Waterton - Castle River region of Alberta. Bulletin of Canadian Petroleum Geology 25:882-906.

Storck, P. L.
1979 A report on the Banting and Hussey sites: two Paleo-Indian campsites in Simcoe County, southwestern Ontario. National Museum of Man Mercury Series, Archaeological Survey of Canada Paper No. 93. Ottawa.

Thomas, Dorothy
1978 The Eley story 1828 - 1978. I. M. I. Kynoch Press, Birmingham, England.

Webb, Robert, Alexander Johnston and J. Dewey Soper
1967 The Prairie world. In Alberta, a natural history. W. G. Hardy, Editor-in-chief. M. G. Hurtig, Publishers, Edmonton. pp. 93-115.

Wettlaufer, Boyd
1960 The Finds. In "The Long Creek site". Compiled by Boyd Wettlaufer and edited by William J. Mayer-Oakes. Saskatchewan Museum of Natural History, Anthropology Series No. 2. Regina. pp. 21-74.

Wilmsen, Edwin N. and Frank H. H. Roberts
1978 Lindenmeier, 1934-1974: concluding report on investigations. Smithsonian Contributions to Anthropology No. 24. Smithsonian Instituation Press, Washington.

Wilson, Michael
1974 The Casper local fauna and it's fossil bison. In The Casper site: a Hell Gap bison kill on the High Plains. Edited by George C. Frison. Academic Press, New York. pp. 125-171.

Wilson, M. and C. S. Churcher
1978 Late Pleistocene Camelops from the Gallelli pit, Calgary, Alberta: morphology and geologic setting. Canadian Journal of Earth Sciences 15 (5):729-740.

Wormington, H. M. and Richard G. Forbis
1965 An introduction to the archaeology of Alberta, Canada. Denver Museum of Natural History Proceedings No. 11. Denver.

ARCHAEOLOGICAL SURVEY OF ALBERTA
OCCASIONAL PAPERS

1. Archaeology in Alberta, 1975. Compiled by J. Michael Quigg and W.J. Byrne. 115 pp. 1976.
2. Archaeological Research in Northern Alberta, 1975. By Paul F. Donahue. 154 pp. 1976.
3. Prehistoric Survey of the Lower Red Deer River, 1975. By Gary Adams. 140 pp. 1976.
4. Archaeology in Alberta, 1976. Compiled by J. Michael Quigg. 103 pp. 1976.
5. Archaeology in Alberta, 1977. Compiled by W.J. Byrne. 141 pp. 1978.
6. Early Cultures of the Clearwater River Area, Northeastern Alberta. By John Pollock. 160 pp. 1978.
7. Studies in Archaeology, Highway 1A, Coal Creek, Alberta. By Michael McIntyre. 171 pp. 1978.
8. The Lazy Dog Tipi Ring Site. By J. Michael Quigg. 49 pp. 1978. (Bound with No. 9).
9. The Alkali Creek Sites; The Lower Red Deer River. By Gary Adams. 127 pp. 1978. (Bound with No. 8).
10. Cypress Hills Ethnology and Ecology: A Regional Perspective. By Rob Bonnichsen and S.J. Baldwin. 87 pp. 1978.
11. The Elk Point Burial: At the Place of the Willows. By Stuart J. Baldwin. 74 pp. 1978.
12. Archaeological Investigations at Writing-On-Stone. By J.W. Brink. 73 pp. 1979. (Bound with No. 13).
13. Stone Circles at Chin Coulee. By James H. Calder. 70 pp. 1979. (Bound with No. 12).
14. Archaeology in Alberta, 1978. Compiled by J.M. Hillerud. 192 pp. 1979.
15. Archaeology in Alberta, 1979. Compiled by Paul F. Donahue. 226 pp. 1980.
16. The Cochrane Ranche Site. By Roderick J. Heitzmann. 202 pp. 1980.
17. Archaeology in Alberta, 1980. Compiled by Jack Brink. 202 pp. 1981.
18. Prehistoric Cultural Dynamics of the Lac La Biche Region. By Edward J. McCullough. 166 pp. 1982.
19. Archaeology in Alberta, 1981. Compiled by Jack Brink. 208 pp. 1982.
20. Culture Change in the Northern Plains: 1000 B.C. - A.D. 1000. By Brian O.K. Reeves. 390 pp. 1983.
21. Archaeology in Alberta, 1982. Compiled by David Burley. 222 pp. 1983.
22. Sibbald Creek: 11,000 Years of Human Use of the Alberta Foothills. By Eugene M. Gryba. 219 pp. 1983.

Alberta
CULTURE

POOR

QUALITY

ORIGINAL